HANDBOOK

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West-American Cone-Bearers

J. G. LEMMON

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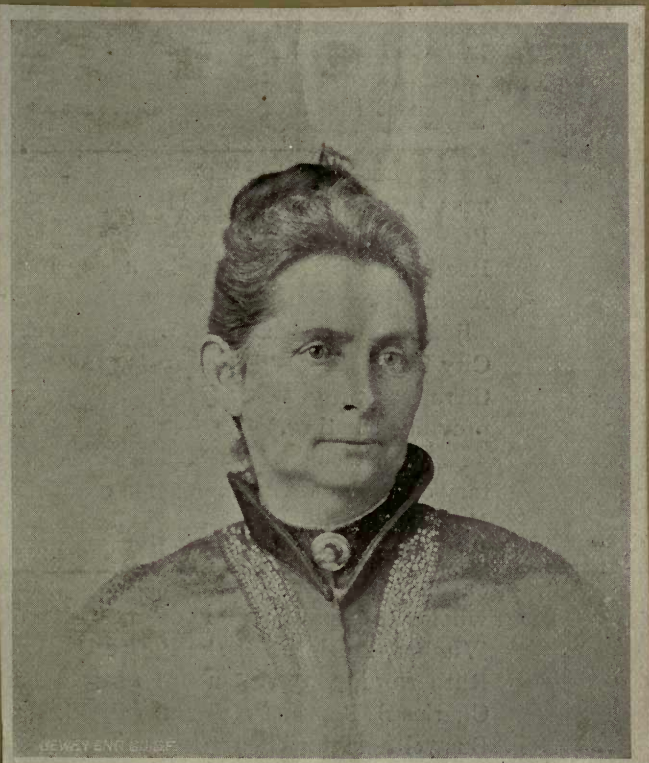

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Author and Celebrated Botanist.

HANDBOOK

OF

West-American Cone-Bearers.

J. G. LEMMON,

OAKLAND, CAL.

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"Good English names with plain descriptions of your noble Western Trees."—SIR J. D. HOOKER.

THIRD (POCKET) EDITION.

JULY, 1895

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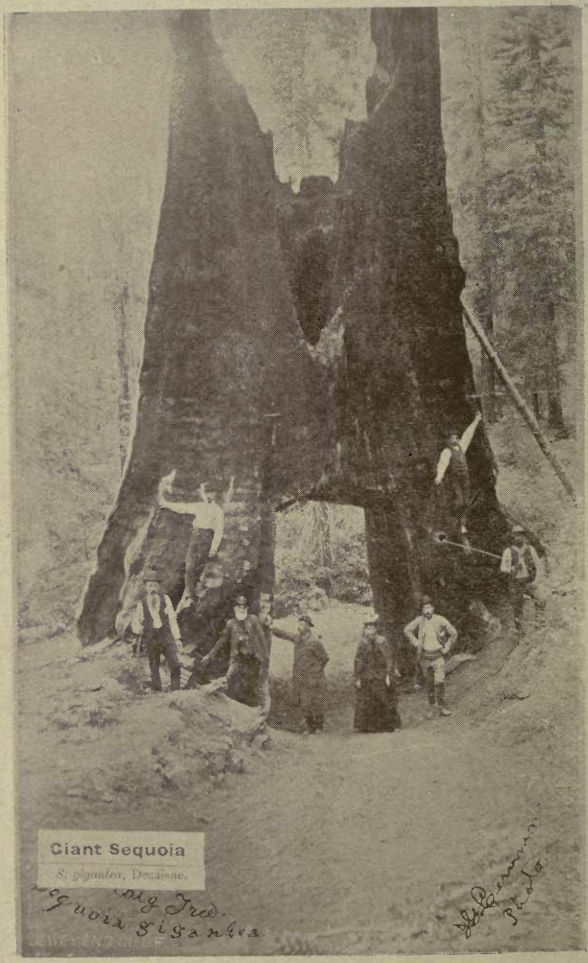

No. 1. Relic of the ancient 5,000-year-old forest in the Tuolumne Big-Tree Grove.

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PREFACE

The Great Northwest Forest.

The presence of such a large number as sixty species of cone-bearing trees in Northwest America, is due, principally, to the fact that they are really natives of more northern or more elevated regions, from which they were expelled ages ago, by the extreme cold of the last Ice-Age; which, in turn, retreated before a Thermal Age, during the prevalence of which the plants returned from the southern hemisphere and spread over the temperate plains, or became stranded upon the cool mountains—finding homes only where their constitutions and their environment permit the maintenance of life and perpetuation of their species.

The great development of these trees into larger forms and bearing larger fruit than trees of any other

region, is due, principally, to the tropic heat of the ocean current—Ku-ro Si-wa—which, striking the Alaska coast, is deflected southward, where it is detained by the many promontories and islands of the far-stretching Pacific Coast, while the southeast trade-winds flowing over the accumulated warm water, become saturated with moisture, which they carry upon the continent, where, meeting with cool elevations of hill and mountain, the vapor is condensed and deposited in torrents upon the coast, diminishing by exhaustion, as it passes inland from range to range of mountains, finishing with a slight rainfall upon the vertebra of the continent—the far-away Rocky Mountains.

In considering the power and tendency of these two fundamental climatic agencies, we should expect to find the densest forest, the greatest variety of trees, and the largest growth of trunk, cone, and leaf in the abundantly watered and moderately heated mountains of the Pacific Coast—and such is the exact revealed result.

AN APPEAL FOR GOOD ENGLISH NAMES.

To botanists, naturalists, school superintendents and teachers, lumbermen, travelers and tree lovers generally, greeting:

Let us institute and maintain a much-needed reform in the use of English or vernacular names for our Western trees.

Let us, first of all, ignore senseless, inappropriate names for our trees.

Let us insist upon suitable names.

Let us insist upon descriptive names.

Let us insist upon distinguishing names.

Let us insist upon having but one name for each kind of tree.

Let us habitually use the one proper name until it is taken up by the public and made the popular name.

I am not now advocating the popular use of the scientific names—that will come about in due time. The youth of America will soon be ashamed not to be as familiar with our principal botanical names as with household words. It will be admitted after a moment's reflection that the only really distinguishing names are those conferred and duly published by scientists having full knowledge of an object and all its relations. These are the technical names—those

of last resort—for they alone may infallibly distinguish any object in nature.

These names are written in Latin, so as to be read and understood by the learned of all nations, but the ordinary English reader often hesitates about dealing with them, not knowing that they are generally easily pronounced, for all the letters are given their proper sound, none are silent, and every vowel is in a separate syllable.

The conferring of English or vernacular names, however, is often left to the indiscriminate fancy of thoughtless persons—those first meeting with the object. For instance, in one short range of California mountains, there are seven different species of pine. Four of these pines are called by the same name, and that the meaningless one, "Bull Pine." Now, one of these species—*Pinus Coulteri*—bears the largest and heaviest cones in the world, often weighing five to eight pounds each. What better name for this tree than Big-Cone Pine? A second—*P. Sabiniana*—has pea-green or grayish foliage, distinguishing the trees from others at a distance. Gray-Leaf Pine is suggested for this tree. The third species—*P. Jeffreyi*—has dark, often black bark, finely checked, in strong contrast with the fourth species, the light-colored well-known Yellow Pine—*P. ponderosa*—with which it is often associated. What better name for this third tree than Black Pine?

I submit the following names for our Western Cone-bearing Trees, selected, for the most part, from the confusion of names in local use, where such were found at all suitable or even passable. In a few instances a new name has been coined, which it is thought aptly describes or designates a given tree, while all senseless or inappropriate names, however common or popular they may be locally, are rigorously ignored.

The subject is of much more importance at this time than may be apparent to the reader, because attention has lately been called to our forest trees by the publication of extended descriptions accompanied by illustrations in our California Forestry Reports.

Vernacular names, with their frequent unfitness, are apt to be long-lived. Shall we see to it that only appropriate ones are used? Example is a potent teacher.

Let us select the best names!

Let us familiarize the good names!

Let us establish the right names!

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CONE-BEARING TREES

—OF—

NORTHWEST AMERICA,

North of Mexico and West of the Rocky Mountains.

—o—

APPROVED ENGLISH NAMES,

WITH

BRIEF POPULAR DESCRIPTIONS.

—o—

"By their fruits ye shall know them."

In these descriptions enough of detail is given, it is hoped, to bring out the characters for certain identification, upon which are based both the Latin and English names of orders, tribes, genera, groups, and species. It will be seen that the English name is often simply the translation of the Latin one.

The publication of these brief, popular descriptions in conjunction with the selection of suitable English names, is designed to aid the public in recognizing and enjoying the trees of our noble Pacific forest, nine-tenths of which are composed of these Cone-bearers, comprised in sixty species and twenty-five marked varieties.

The plates—seventeen in number—selected to illustrate the principal characters distinguishing Tribes, Genera, and Species, are mostly copies of water-color paintings by Mrs. Lemmon.

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CONE-BEARERS.

FIRST NATURAL ORDER.

CONIFERÆ.

(PINACEÆ of certain authors.)

Resinous, mostly evergreen, trees (rarely shrubs) of cool, mostly northern regions; fruit (called a cone) mostly cone-shaped and scaly; leaves mostly needle-shaped; flowers of two kinds, male and female.

Separated by fundamental modes of development into Two Divisions:—

DIVISION I.

SPIRALES.

THE SPIRAL-CONE TREES.

PINES AND THEIR ALLIES.

Trees with spiral development, *i. e.*, their leaves, bracts, and cone-scales, arise from the stem or cone-

axis, in spiral lines or coils, from below upward, and from base to apex. Cones requiring at least two seasons to mature.

Separated by general characters into Three Tribes:—

Tribe One.—ABIETINEÆ.

THE NORTHERN PITCH-TREES.

Very resinous trees; fruit a woody or leathery cone, or bur, of spirally overlapping scales on an elongated axis, each scale bearing two usually winged seeds. Flowers monœcious, *i. e.*, on separate branchlets of the same tree. All natives of the Northern Hemisphere.

Separated by foliage-association into Two large Sub-Tribes:—

Sub-Tribe One.—FASCICULÆ.

FASCICLE-LEAVED PITCH-TREES.

Trees with the conspicuous secondary leaves in fascicles or bundles of 2 to 5 each, or in elongated tufts of many leaves in each.

Separated by foliage-duration into Two Classes:—

Class A.—PERSISTENTES.

EVERGREEN FASCICULARS.

Trees with leaves persisting for several years; cones requiring at least two seasons to complete their growth. Two Genera—PINUS and CEDRUS—True Pines and Cedars.

First Genus, PINUS—Tournefort.

THE TRUE PINES.

Very useful trees with leaves in fascicles of 2 to 5 each (one species single-leafed), sheathed at base, with scaly wrappings. Fruit, a cone or burr of diverse forms—conical, cylindrical, and globose—and requiring two years to mature (two species require three years). Cone scales with protuberances usually tipped with spines or prickles. Male flowers numerous, cylindrical, ½ to 4 inches long, usually forming a rosette at or near the end of branchlets. Seventy-seven known species, twenty-five in Northwest America. (Only the twenty-five American species will be described in this Hand-book.)

Separated chiefly by characters of the wood into Two Sub-Genera:—

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Sub-Genus 1. STROBUS.

SOFT-WOOD OR WHITE PINES.

Cones with the exposed part of the scales (the apophysis) usually thin, and with an apical protuberance (umbo), devoid of prickles or spines. Leaves in 5's, short, 1½ to 2 inches long, their sheaths loose and deciduous.

Wood mostly soft, whitish, less resinous than that of the other sub-genus. Five species in Western America, in Two Groups:—

Group 1. Long-Cone Lumber Pines. *Elongatæ.*

Cones long, narrow, cylindrical, 8 to 26 inches long and 1 to 4 inches thick, on long stems, becoming pendent the second season and breaking the stem at maturity. Trees usually very large, with grayish, finely-checked bark; foliage light green.

A peculiarity of this group of trees is the specialized long upper limbs bearing the cones, and the short lower ones, which soon decay and fall; thus the trees, self-trimmed while yet small, swell out their matchless stems with smooth trunks reaching up to a great height, affording the longest clear lumber lengths for saw-logs of any tree known.

Three Species:—

No. 1—**Great Sugar Pine** - *Pinus Lambertiana*, Dougl.

Trees of the largest dimensions, 120 to 200, or, favorably situated, 250 to 300 feet high and 10 to 20 in diameter; lumber easily worked, very light, white and valuable for interior finish, for doors, blinds, sash, etc. Trees never occupying a region exclusively, but scattered among other species of the Coast, Cascade, and Sierra Mountains at middle elevations. Cones, usually a bronze green until ripe, 2 to 4 inches thick (6 inches when opened) and very long, 10 to 26 inches—the longest known. Male catkins numerous, yellow, 1 to 2 inches long, in clustered rosettes near end of branches.

The GREAT SUGAR PINE is the accepted, the crowned, prince of the Pine family. Not only by virtue of its unexcelled dimensions and the magnitude of its cones is it regal, but it is a most kingly monarch in its majestic, lofty bearing, its erect, self-asserting dignity, and its bowed head, obedient to its only masters—the powers above. Only the supreme emperor of the whole vegetable world, the immense *Sequoia*, also a denizen of our great Sierra forest, and admitting the Sugar Pine to fellowship, excels in dimensions (every way but in fruit) this noble, dominant tree of the whole western world.

We can well imagine the ecstasy of delight, and excuse the mild self-gratulation with which David Douglas, the discoverer of this noble tree, writing from the Falls of the Columbia River, March 24, 1826, to his friend, Dr. Wm. Hooker, of London, inscribes:—

"I rejoice to tell you of the discovery of a new species of Pine, the most princely of the genus, perhaps even the grandest specimen of vegetation known."

Douglas also reported: "The trees yield a sweetish substance, which I am almost afraid to say is sugar." It is this saccharine, soluble gum, exuding scantily from injured trees, that suggested the name, "Sugar Pine."

PURPLE-CONED SUGAR PINE. Var. *purpurea.* n. var.*

A smaller form, with darker, finer checked bark and different wood—well known to lumbermen—and with shorter, purplish cones, less attenuate towards the ends than the typical species, often accompanies it in the high Sierra, and may receive the above names.

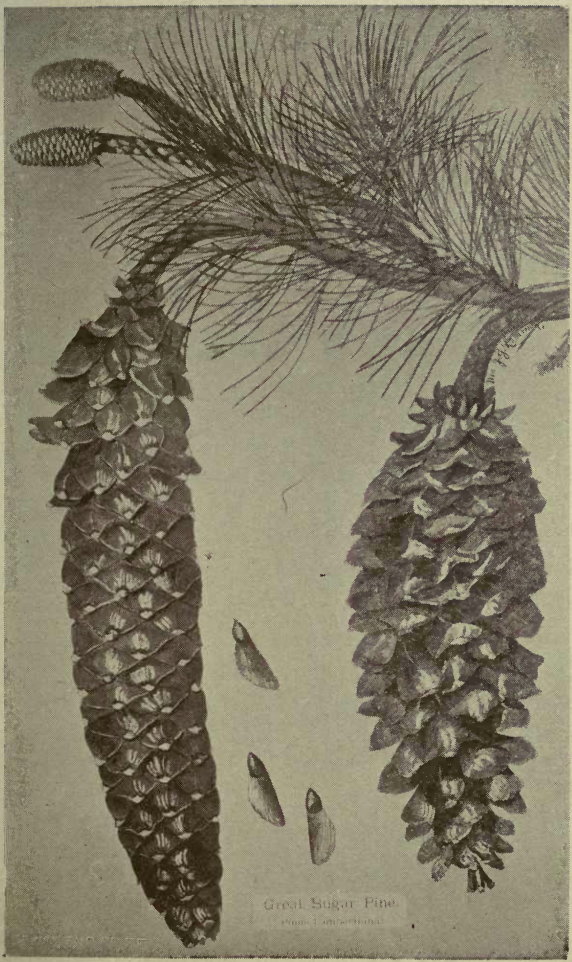
No. 2—**Mountain Pine** - *P. monticola*, Dougl.

Smaller, lighter-barked trees than the preceding; in subalpine regions of the Sierra, but northward in Oregon, Washington, and Montana, found at lower elevations, as is common with other trees that are alpine in southern situations; cones narrow, 6 to 12 inches long; scales thin, weak, reflexed at maturity. In some localities called "Little Sugar Pine."

FINGER-CONE PINE. Var. *digitata.* n. var.*

A small form, with thicker, darker bark, and clusters of small cones not larger than a man's fingers, found near the coast, from Northern California to British Columbia, may receive the above name.

*New varieties not, before published.



No. 2. Characters of the Long-coned group of the White or Soft-wood, Lumber Pines.

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No. 3—**Arizona White Pine** - - - -

P. Ayacahuite, Ehrenb. Var. *strobiformis*, Sargent.

Large trees of the highest mountains in Arizona and Northern Mexico, with cone-scales long, thick and spoon-shaped, strongly reflexed at maturity (hence once named *P. reflexa* by Dr. Engelmann).

Group 2. Alpine White Pines.

Alpinæ.

Smaller, often depressed and very aged trees of the Southern Rocky Mountains and Great Basin region, or alpine on peaks of more northern and western regions.

Two species:—

No. 4—**Rocky Mountain White Pine** -

P. flexilis, James.

Standard or sometimes depressed trees of the Rocky Mountains and a few on the peaks of certain mountains of Nevada, Northern Arizona, and the Southern Sierra. The principal timber tree of Utah and Nevada. Branches often very slender, in southern forms (Northern Arizona) quite robust.

Arizona Flexilis Pine. Var. *macrocarpa*, Engelm.

A round-headed tree on the San Francisco Mountains, Northern Arizona, with more robust branchlets and larger cones, 6 to 8 inches long.

No. 5—**White Bark Pine** - *P. albicaulis*, Engelm.

Very white-barked, often depressed trees, forming the timber line on certain peaks of the Sierra, Cascade, and Rocky Mountains. Cone globular, set close upon the short, stout, erect, white, annual stem.

Peculiarities of the Alpine Pines.

Usually erect and aspiring, 15 to 30 feet, in the edge of the alpine forest, these white-limbed trees often press up along the glacier-graven, wind-swept passes of the mountains, battling with eternal snows and sand-blasts, until they become depressed, flat-topped and so close-roofed with condensed branchlets and leaves that one may walk as safely over them as upon a platform of planks. These sylvan tables—prepared in the wilderness and just filling a rock basin to its rim—are supported from the downhill side by a single leg, a sturdy trunk, only a few feet high, yet 12 to 18 inches thick; close-grained and tough as hickory, and golden yellow with accumulated pitch. Ring countings, by the aid of a lens, reveal their ages, 500 to 800 years. Survivors of an early generation, they are protected from the ruthless enemy—fire—by their isolation and their half-yearly tomb of ice.

Sub-Genus 2. PINASTER.

HARD-WOOD PINES.

Cone-scales with exposed part (apophysis) generally thicker than those of the other sub-genus; the pro-

tuberance dorsal (*i. e.*, on the back) mostly terminated by a conspicuous prickle or spine; leaves various, usually long, in fascicles of 2, 3, or 5, their sheaths mostly persistent for several years. Wood usually darker, harder, more resinous than the White Pines.

A large number of species, 19 in western America.

Divided by position of cones into Two Sections:—

Sec. One.—TERMINALES.

SUB-TERMINAL-CONED PINES.

Cones arising among the leaves near the end of the bearing shoots, or just below the bud, usually falling soon after ripening, rarely remaining persistent for several years. Male flowers forming a rosette of many long, brown catkins at the end of branchlets with the leaf-bud or a few leaves in the center—the position of the flowers corresponding to that of the cones.

Three Sub-Sections:—

Sub-Sec. 1.—*Brachyphyllæ.*

SHORT-LEAVED PINES.

Leaves very short, 1 to 2 inches long, their sheaths soon falling away in the two first groups.

Three Groups:—

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Group 1. Plume-Branched Pines.

Plumosæ.

Cones oblong, cylindrical, 3 to 5 inches long, pendent from the long plume-like branchlets; leaves in 5's. Sub-alpine trees of the Rocky Mountains, Great Basin, Arizona, and with a few trees on the Sierra.

Two Species:—

No. 6—**Balfour Pine** - - *P. Balfouriana*, Jeff.

A few trees in sequestered nooks on Mt. Eddy, near Shasta, and in the vicinity of Mt. Whitney. Nearly smooth cones with very small prickles.

No. 7—**Foxtail Pine** - - *P. aristata*, Engelm.

Similar, but smaller trees, on a few peaks of the Southern Sierra, but chiefly in Arizona, New Mexico, mountains of the Great Basin, to Colorado. Cones with conspicuous half-inch, bristle-like prickles.

Group 2. True Nut-Pines. *Edules.*

Trees native to dry interior regions; leaves short, white-lined above, and heavy-scented; cones small, globose, on short stems, from which they promptly separate at maturity; cone-scales few, thick, protuberant, but devoid of prickles; seeds few, large, much used by the aborigines formerly, and by the Spanish Americans at present, for food. Four closely related Species in Two Pairs:—

AMERICAN NUT-PINES.

Cones sub-globose, 1½ to 2 inches thick; scales few, very protuberant, without prickles, widely opening at maturity, loosely holding the large, delicious seeds.

No. 8—**Nevada Nut-Pine** - - - -
P. monophylla, Torr. and Frem.

Small, branching trees of the Great Basin, the eastern slopes of the Sierra and the Tehachapi and San Bernardino Mountains; leaves solitary, robust, terete, sharp-pointed; seeds large, soft shelled. (The only single-leaved pine known.)

No. 9—**New-Mexican Pinyon** - *P. edulis*, Engelm.

Small trees of Colorado and southward through New Mexico and eastern Arizona to western Texas. Headquarters in New Mexico. Branching trees with small, few-scaled cones and very nutritious seeds; leaves slender, mostly in twos; the seeds largely collected for export to California, southern and eastern markets. (Perhaps only a variety of the preceding.)

MEXICAN PINYONS OR NUT-PINES.

Cones globose and seeds much like the preceding. (Not strictly in our northwest development, but partly included.)

No. 10—**Parry Nut-Pine** - *P. Parryana*, Engelm.

Small trees in the San Rafael Mountains, on the peninsula of Lower California, with a few specimens extending into San Diego County, California. Cones smaller than the preceding, with soft-shelled seeds; leaves in 5's, often in 4's, robust.

No. 11—**Stone-Seed Pinyon** - - - -
P. cembroides, Zuccarini.

Small, round-headed trees of Arizona and Northern Mexico, with small cones, but with very large, hard-shelled seeds, largely used in Mexico for food and much exported. Leaves slender, mostly in 3's.

Group 3. Thimble-Cone Pines.

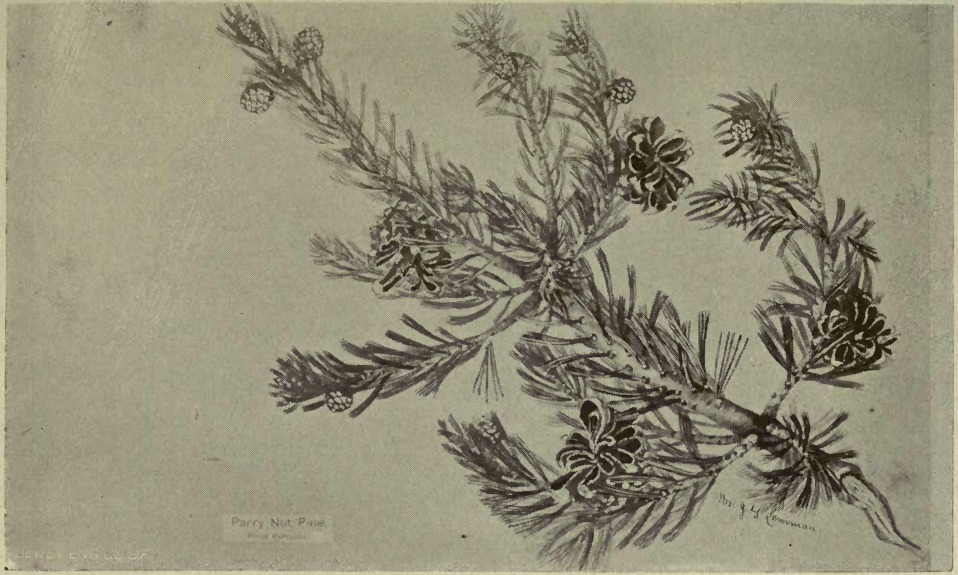
Parviconæ.

Cones very small, slender, 1 to 3 inches long; leaves short and in pairs.

Two Species:—

No 12—**North-Coast Scrub Pine** - -
P. contorta, Dougl.

Usually small, scrubby trees, on sandy dunes and exposed promontories of the northwest coast of California, northward to Alaska, the very small cones often remaining on the trees for many years. The cones are singularly variable—even on the same



No. 3. Characters of the globe-coned, Nut-Pine group of the Short-leaved Pines.

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trees; some of them have the external, basal scales abnormally developed as conical tubercles tipped with a strong prickle; others are tubercled only at the end of the cone; others still are tubercled on the outer side, from end to end. The southernmost trees (near Mendocino) often become quite large—25 to 50 feet high, and 2 to 3 feet thick, the bark 2 to 3 inches thick.

This is the northernmost of the four species of sea-loving, fog-nurtured, aggressive, fighting pines of our western shore, from Alaska to San Diego. Pressing along the promontories too near the sea, they are beaten almost prostrate by ocean gales and become close-set, round-shouldered, flat-headed, many-limbed trees with dense foliage, offering long reaches of wind-breaks, behind which hosts of tender plants from the interior flourish and flaunt their profusion of flowers in serene security.

BOLANDER'S PINE. Var. (*a*) *Bolanderi*, Lemmon.

P. Bolanderi. Parlat. Prod. xvi, p. 379.

A dwarfed form, 4 to 15 feet in height; spire-shaped, with short, narrow, light-colored leaves an inch long, and small, variable cones (varying on the same tree, like those of the typical form), the size and color of tree in striking contrast to the dark green foliage of the typical species found abundantly on the near-by coast. On the white, ashy, narrow, almost sterile "Plains" paralleling the coast at Men-

docino, a few miles interior. First visited by Prof. H. N. Bolander, 1866.

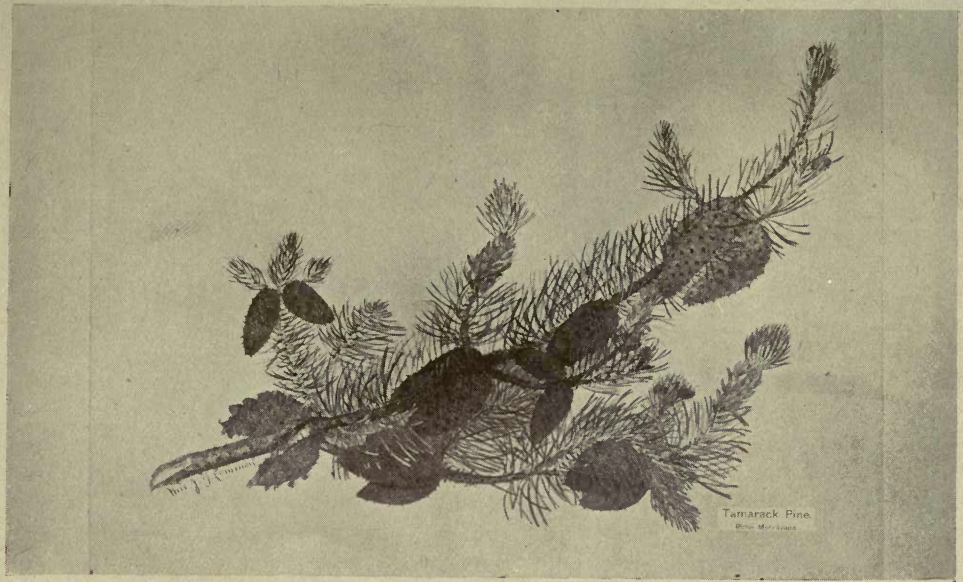
HENDERSON'S PINE. Var. (*b*) *Hendersoni*, Lemmon.

Larger trees, with cone-scales uniformly developed (all slightly tubercled at the external base). Bark of largest trees broken more or less into small square checks, resembling white oak. Interior of western Oregon and Washington. Some of the characters first detected by Prof. L. F. Henderson.

No. 13—**Tamarack Pine** - *P. Murrayana*, Balf.

Tall, slender trees in wet, sub-alpine swamps of the Arizona, the Sierra and Cascade Mountains, northward to Upper Yukon River; also in the Rocky Mountains. Cones ovate-conical, 1½ to 2½ inches long, uniform in length and scale development. Trees attacked by insects and bark-eating birds, hence usually discharging pitch or gum very abundantly. Bark very thin, only one-fourth to one-half inch thick, resembling that of eastern and Old-World Tamarack, hence the tree is often considered to be a true Tamarack. Wood tough and light-colored. (Until recently confounded with *P. contorta*, but clearly distinct.)

Another small-cone pine, the "Jack Pine"—*P. Banksiana*—a native of the northern States and Canada, approaches the Northwest in the region of British Columbia. It is a small tree, with its peculiar, small, persistent



No. 4. Characters of the two-leaved, Thimble-coned group of the Sub-terminal-coned Pines.

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cones curving and pointing toward the apex of the branch, like little horns (the only instance in the family of pines). Leaves in pairs, very short.

Sub-Sec. 2.—*Fracticonæ.*

BROKEN-CONE LUMBER PINES.

Cones breaking away at maturity from the short stem by an irregular, transverse fracture within the base. They are of medium size, ovate-conical, 4 to 8 inches long, and half as broad at base; leaves in 3's, 5 to 8 inches long. Large trees, with thick, deeply-fissured bark, and yellowish wood of strong fiber. Widely distributed at middle altitudes, from British Columbia southward along the mountain ranges to Mexico, and eastward to the Rocky Mountains and Black Hills. Very valuable timber trees.

Many thousands of square miles in the vicinity of Truckee, Madera, and Mt. Shasta have been denuded of their forest covering, mostly composed of these two species, while much of the intervening region is more or less stripped, inviting the forest fire and the mountain torrent, while menacing with drought the now fertile plains below. Happily, under favoring circumstances, many regions are being re-forested with a dense growth, notably on the eastern slope of the Sierra, where the first clearings were made.

The Broken-Cone Pines form two groups:—

Group 1. Common Lumber Pines.

Communes.

Widely distributed and variable trees. Two species:—

No. 14—Western Yellow Pine

P ponderosa, Dougl.

Trees of the largest size, 200 to 300 feet in height, and 5 to 15 feet thick; bark in the typical form, yellowish or whitish, mostly very thick and deeply fissured into large plates; cones conical-ovate, 2 to 5 inches long; male flowers long and flexuous, forming large rosettes, 3 to 5 inches across, on the ends of branchlets, with a leaf-bud or a few leaves in the center. The broken branchlets exhale an odor of turpentine. First detected, 1826, by David Douglas, "between the Columbia and Spokane Rivers," eastern Washington. Afterward found to be widely distributed.

The first thought that must enter the mind of a reflective observer when he finds himself in a Yellow Pine forest is that a half dozen or more kinds of pines are about him, and such, indeed, is the lumberman's view of the subject. He sees whitish or yellow-barked trees with large longitudinal plates, which, when cleft by his ax, crumble to hundreds of buttons, revealing but a few layers of sap-wood. The next tree met with may have darker, harder bark and more layers of sap-wood. A third tree will intensify these characters, and so on until perhaps not five rods away is a brown-barked, low-limbed tree that he might cut almost to the center before

reaching the heart-wood. And the cones of these several forms will vary as greatly, generally the smallest cone is produced by the lightest-barked tree; yet all belong to the one species. This species—as well as four or five others—has been called by thoughtless persons, "Bull Pine," a meaningless term, unfit to apply to any pine, besides its indiscriminate use for half a dozen species has led to no end of confusion.

VARIETIES OF YELLOW PINE.

BROWN-BARK PINE. Var. (*a*) *nigricans*, Lemmon.

Trees of medium size, one hundred and twenty to one hundred and fifty feet high, flourishing in moister situations than other forms, longer retaining their numerous limbs, hence more symmetrical and spire-shaped or rounded in outline.

Bark dark brown or almost black, hard, comparatively thin, rather coarsely checked, sap-wood of many layers, heart-wood consequently meager, often very resinous; rosettes of male flowers especially conspicuous, 4 to 5 inches across.

This form is generally found in company with the larger, typical, whitish-barked trees, but in moister localities. It is particularly prevalent in small valleys and along the edges of forests in the Sierras, and southward to Northern Arizona.

FOOTHILLS YELLOW PINE. Var. (*b*) *Benthamiana*, Vasey.

Medium-sized trees in the Coast Mountains and

Western Sierra foothills, usually spire-shaped; cones smaller and narrower than the preceding.

ROCKY MT. YELLOW PINE. Var. (*c*) *scopulorum*, Engelm. Trees of the Rocky Mountains, westward to the eastern slopes of the Sierra Nevada and Cascade Mountains. The principal lumber tree of the Rocky Mountains. Leaves often in pairs and remaining on the limbs several years.

No. 15—**Black Pine** - - *P. Jeffreyi*, Murray.

Chiefly distinguished from the *ponderosa* species (with which it is often associated) by the trees affecting usually more elevated regions, and having darker, finer-checked bark and longer, out-reaching limbs; the young branchlets and leaves are slightly colored by a whitish powder; also, when broken, they exhale a pleasant, aromatic odor like that of orange; cones large, 6 to 10 inches long, ovate, with strong prickles. Male flowers, larger, 3 to 4 lines in diameter, but shorter, 1 to 2 inches, forming dense rosettes or heads with a leaf-bud or a few leaves in the center.

Trees of higher localities from Western Montana through Idaho, Oregon and California to the peninsula of Lower California; particularly abundant on the Southern Sierra and the San Bernardino Mountains. First detected by Jeffrey, near Mt. Shasta, 1852. Trees of this pine, near Oroville, Cal., are tapped annually, and large quantities of pitch ob-

tained, which, being distilled, forms the basis of medical preparations called Abietene, Santa Abie, etc.

VARIETIES OF BLACK PINE.

SIERRA RED-BARK PINE. Var. (*a*) *deflexa*, Lemmon.

P. *deflexa*. Torr. Bot. Mex. Bound. 209.

This form constitutes one of the principal timber trees of the high Sierra, notably near Truckee. The bark is usually reddish brown, thick, coarsely checked as if braided, especially toward the top of the tree; cones large, 6 to 10 inches long.

PENINSULA BLACK PINE. Var. (*b*) *peninsularis*, Lemmon.

On the San Rafael Mountains of Lower California; bark dark brown, thick, deeply furrowed; cones remarkably abundant and large, 6 to 8 inches long.

MONTANA BLACK PINE. Var. (*c*) *montana*, Lemmon.

A tree of the lake region of western Montana, "with purple cones and long, glaucous foliage."

Group 2. Little-Known Lumber Pines. *Novitates.*

Three Species of Arizona and Chihuahua.

No. 16—Arizona Five-Leaved Pine

P. Arizonica, Engelm, 1878.

A middle-sized tree 40 to 60 feet high, branches spreading; leaves in 5's, 5 to 7 inches long; cones

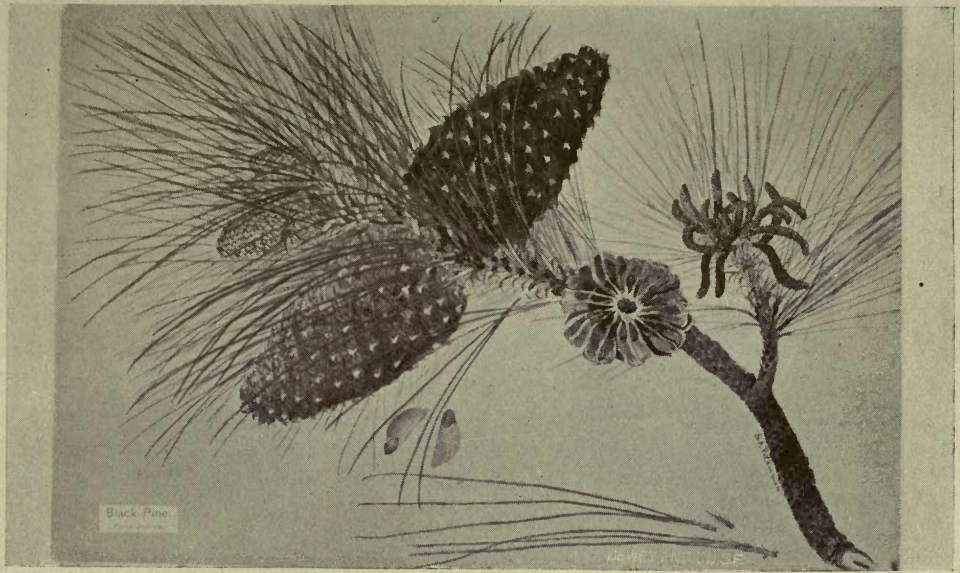
oval, $2\frac{3}{4}$ inches long, $1\frac{1}{2}$ thick, scales with a prominent umbo, which, in the lower ones, is recurved, and armed with a small, recurved prickle. On the highest mountains of Arizona and northern Mexico. First detected by Dr. Rothrock, in the Santa Rita Mountains, 1874.

No. 17—**Broad-Leaved Pine** - - - *P. latifolia*, Sargent, 1889.

Medium-sized trees, with dark, deeply furrowed bark, and tortuous branches; leaf-bracts $\frac{3}{4}$ inch long with scarious, lasciniate margin; leaves 12 to 16 inches long and about 1 line wide; cones ovate, oblique, 3 to 5 inches long, the scales with recurved apophyses and stout, projecting, mammillary umbos tipped with slender prickles. Discovered by Dr. Henry Mayer, 1887, in the Santa Rita Mountains, southern Arizona. A few trees in the Huachuca Mountains, southward.

No 18—**Apache Pine** - *P. Apacheca*, Lemmon.
(ERYTHEA, Vol. II., No. 6, June 1, 1894.)

Yellow-barked trees of medium size, with robust branchlets, large and long leaves 10 to 14 inches, their bracts long and lasciniate; cones ovate, 3 to 5 inches long, the scales few, large, the apophysis prominently elevated, but not recurved, the umbo quadrangular, armed with a stout, deltoid spreading prickle. Abundant on the Apache-infested, Chirri-



No. 5. Characters of the common, long-leaved, Broken-cone group of the Hard-wood Lumber Pines.

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cahua Mountains of southeastern Arizona. Discovered 1881 and 1892.

(A wide extension of characters given to the cones of the original *P. latifolia*, may make that species include this Apache pine, but probably further investigation will determine that both forms are but varieties of the polymorphous *Pinus ponderosa*.)

Section Two.—LATERALES.

LATERAL-CONED PINES.

Cones arising laterally, *i. e.*, along the bearing stems, usually at some distance from the apex; mostly not falling at maturity, but persisting, and either becoming inclosed by the later layers of wood, or the peduncle is stretched and at length broken by the enlargement of the tree, while the cone is often carried outward confined in the bark, leaving a channel behind it to the heart of the tree; hence the trees make defective, pin-hole lumber. Leaves large and long, 6 to 16 inches. Male flowers numerous, forming ruffles about the branchlets at some distance from the terminal bud, corresponding in position to that of the cones.

Group 1. Heavy-Coned Pines.

Graves.

Cones of the heaviest, largest, and hardest descrip-

tion, on long, stout, spreading peduncles, usually opening at maturity, often remaining until forced off by the enlargement of the tree. Scales of the cone very large and thick, especially on the outer side at the base, usually terminating in long, stout, curved spines or hooks; seeds very large, black, thick shelled. Leaves in 3's or 5's, very large and long, 8 to 16 inches. Picturesque trees, remarkable for their usually divided trunk or very long limbs, and for their heavy, spine-bearing cones.

Three species in California:—

No. 19—**Torrey Pine** - - *P. Torreyana*, Parry.

Small trees not to exceed a few hundred in all; buffeted, often prostrated by the ocean winds at Del Mar, San Diego County, with a few on Santa Rosa Island. Leaves in 5's, very large and long, 8 to 12 inches. Cones (often sub-terminal) are mahogany brown, broadly ovate, 4 to 6 inches long, weighing 1 to 2 pounds, and armed with short, stout spines; cones remaining on the tree for four years; seeds very large, like No. 21. (Often called Lone Pine.) This is one of the four storm-beaten beach pines of the western coast.

No. 20—**Big-Cone Pine** - - *P. Coulteri*, Don.

Trees of medium size, with dark green, abundant, three-leaved foliage, composed of very large and long leaves, 10 to 16 inches long. Cones elongated, ellip-

tical, of matchless size and weight, 15 to 20 inches long, and often weighing 5 to 8 pounds, the scales terminating in very large spines or hooks. The outer spines are often 2 to 4 inches long, and curved like a nail-grab. Trees of limited range in the Southern Coast Ranges and San Bernardino Mountains.

This tree, remarkable in many characters, is distinguished above all pines for bearing the heaviest cones known; also that these cones are armed with the largest of spines.

No. 21—**Gray-Leaf Pine** - - *P. Sabiniana*, Dougl.

Usually small, round-headed trees of the hot, sloping foothills from Redding southward on both the Coast and Sierra Mountains, to the Tehachapi Range and reported from San Diego County. Trees with divided trunks and scant foliage of a striking glaucous or grayish color, all but the leaves of the season drooping downward, or early falling away. Cones dark brown, broadly ovate, weighing 2 to 5 pounds, armed with stout, short hooks; seeds very large, one-half to three-fourths inch long, with a thick, narrow wing, making the seed look like a large black pearl in a broad amber setting. Leaves in 3's. Quite a variable species, a form on Mount Diablo resembling the preceding.

It has been noticed that this tree in its habitat

indicates the exact range of best fruit lands in central and northern California.

The large seeds of this pine were formerly used for food by coast tribes of Indians, a practice now entirely discontinued, since the aborigine prefers the white man's flour; hence "Digger Pine" is properly disused. The permanence and prevalence of the striking whiteness of these trees, causing them to resemble masses of fog on the plains, or bands of clouds in the mountain cañons of California, fully justify Gray-Leaf Pine for this beautiful, white-foliaged tree.

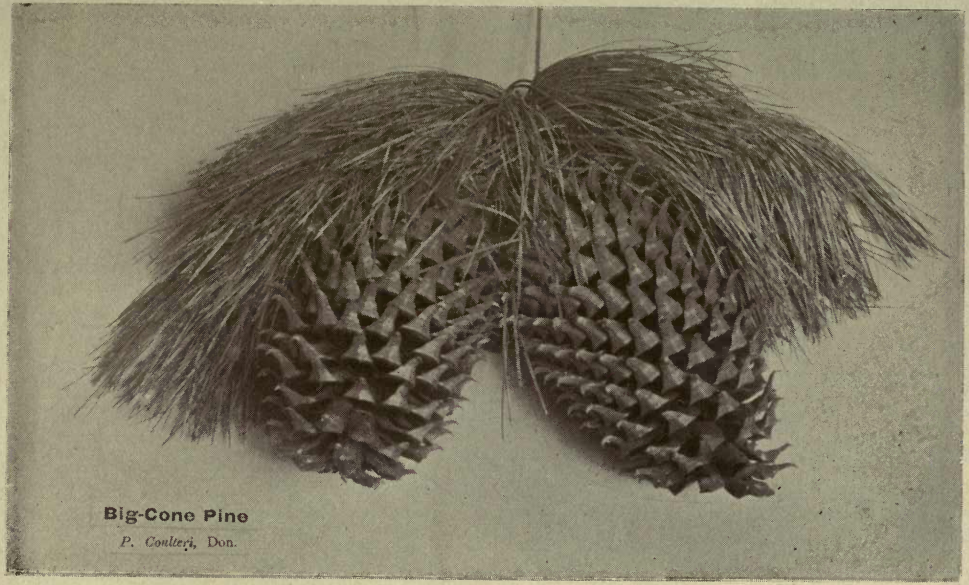
Group 2. Closed-Cone Pines.

Serotinæ.

Cones in whorls or circles about the tree and limbs, usually quite persistent, strongly declined, oblique and gibbous, with tubercled scales, tardily opening, usually remaining long-closed, holding the seed, which is, nevertheless, preserved in good germinating order for many years—30 or more. Small trees mostly crowded into dense groves, hence tall and slender; maturing fruit when quite young. Leaves in 3's or 2's. Four Species:—

No. 22—**Monterey Pine** - *P. radiata,* Don. 1837.
P. insignis, Loudon, 1844.

This is one of the four sea-loving and sea-nurtured pines of the Pacific Coast, from Pescadero, near San Francisco, southward to Monterey and San Simeon



No. 6. Characters of the long-leaved, long-spined, Heavy-coned group of the Lateral-coned Pines.

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Bays, particularly abundant on Point Pinos, on which the city of Pacific Grove has arisen. Trees of general spire-shape, with limbs retained if removed from the sea, but gnarled and brow-beaten if near the beach. Largest trees 80 to 100 feet high, with black bark, very hard, and 2 to 3 inches thick. Foliage bright green, leaves in 3's, 4 to 6 inches long; cones chestnut-brown, widely variable, obliquely oval or longer, 3 to 7 inches long, 2 to 4 inches thick at base, scales on the outer side, especially at the base in the larger form, swelled out into nearly hemispherical tubercles or knobs one-quarter to one-half inch high, and twice as broad, becoming devoid of prickles.

Largely cultivated for its abundant foliage, great endurance, and its rapid-growing character—like all the sea-nurtured species, the annual layers of wood ½ to an inch thick being not uncommon. The largest form of this species is the proper Knob-Cone Pine, and not the next species (*P. attenuata*), with its narrow, long cone, and conically developed scales. The Monterey Pine is remarkable as the earliest discovered pine of the west, the one described under the name of *Pinus Californiana*, by the botanist of the Perouse expedition, 1787, it having been collected "At Monte del Rey, near the sea."

VARIETIES OF MONTEREY PINE.

Small-Coned Monterey Pine. Var. (*a*) *tuberculata*, Lemmon.*

Pinus tuberculata, Don. 1837.

Trees mingled with the large-coned form, or choos-

* New variety, not before published.

ing more northern localities. Cones smaller, 3 to 4 inches long, with few, small tubercled scales on the outer side, mostly at the base. Otherwise not distinguishable from the other form which was published by the same author in *Transactions Linnæan Society*, just before this on the same page, hence the name for the other form *radiata* holds for the species, and *tuberculata* may be retained for this variety of it.

Two-Leaved Insular Pine. Var. (*b*) *binata*, Engelm.

Small, scrubby trees with leaves mostly in pairs, the cones very small, about 3 inches long and nearly devoid of tubercles. A few trees on the islands of Santa Cruz and Guadaloupe.

No. 23—**Narrow-Cone Pine**. *P. attenuata*, Lemmon. *P. tuberculata*, of Gordon, 1849 (a previously used, and, therefore, untenable name for this species.)

Usually small, early-bearing, slender trees on sunny slopes of the Cascade Range to the Northern Sierra and southward, rarely on the Coast Ranges, to the Santa Cruz and San Bernardino Mountains. Cones in circles, strongly declined, narrow and pointed, 3 to 7 inches long, remaining on the trees and unopened for an indefinite number of years. The outer scales with conical, quadrangular tubercles, terminated by a very short, deltoid, firm prickle. Leaves in 3's, 3 to 6 inches long.

Often called "Knob-cone Pine," but the largest

form of the preceding species better deserves that name on account of its half-inch, hemispherical tubercles. First detected in the Santa Cruz Mountains by Hartweg, 1846.

A peculiarity of this tree is the tapering character of its cones at base, whereby they oppose so little resistance to the growing trunk that the annual layers, instead of crowding off the cones (as happens to the broad-based cones of other species in this group) often envelop them completely. They are found in large trunks still unopened and preserving good seed. It emphasizes the importance of this fact to state that the seeds of deciduous-coned pines will not germinate after two years' keeping.

No. 24—**Prickle-Cone Pine** - *P. muricata*, Don.

Small, often slender, trees, usually in swampy places, or on the wind-beaten bluffs along a limited portion of the Coast Range from Mendocino to Lower California, mostly northward from San Francisco. Rapid-growing trees. Bark on protected trees, a little back from the sea, very hard and thick, 4 to 6 inches. Cones in whorls or circles, ovate, 2 to 3 inches long, with small tubercles and long, sharp, persistent prickles. The cones have been known to remain unopened for 20 to 30 years, then to release good seeds. Leaves in pairs, usually long, 3 to 6 inches. This is one of the four storm-beaten Coast pines of our western slope.

ANTHONY'S PINE. Var. *Anthonyi*, Lemmon.

Small trees with short leaves and cones about 2

inches long. Near San Quentin, Peninsula of California. Collected by A. W. Anthony, 1889.

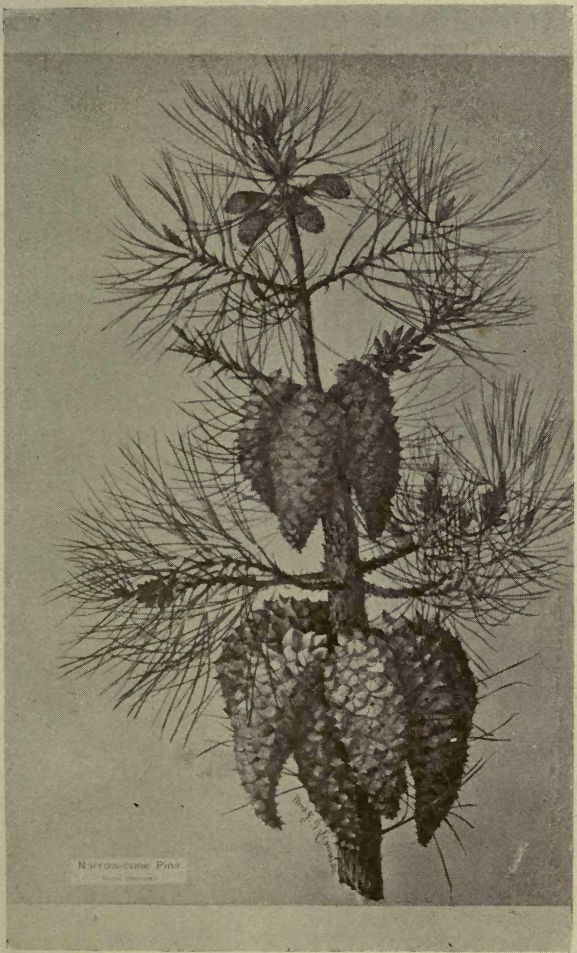
No. 25—**Chihuahua Pine** - *P. Chihuahuana*, Engelm.

Medium-sized trees, often with crooked trunks; leaves in 3's, slender, 2½ to 4 inches long, glaucous above, the sheath of long, shining, loose, deciduous bracts, cones requiring three years to mature, top-shaped, 1½ to 2 inches long, knobs of scales small, bearing small, recurved, soon-falling prickles. Peculiar for its three-year cones (the only case in America) and among the Laterales, for its deciduous leaf-sheaths. Mountains of Southern Arizona and Northern Mexico.

YEARLING CONES OF THE PINES.

During the first of the two seasons required to mature a pine cone, it enlarges but little, although the prickles (if the cones are to be armed) are largely developed, and the cones may have a different color than that they assume during the second season. Pine cones are either almost stemless, or with stems of different length, varying with the species, from ½ to 4 inches.

Most of the yearlings are globular. Such are the True Nut Pines, with their light yellow little balls about ⅜ inch thick, set close on the branchlet and devoid of prickles. The Thimble-Cone Pines have smaller yearlings, about ¼ inch in diameter, rose-red and bristling with long, slim prickles. The Prickle-Cone Pine has dark-red



No. 7. Characters of the whorled, persistent, Closed-cone group of Lateral-coned Pines.

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yearlings about ½ inch in diameter, including the already long, sharp prickles. The Torrey Pine shows a dark tawny ball, about an inch in diameter, raised out on a stem about ¾ inch long. The Gray-Leaf Pine exhibits a dark yellow globe, slightly pointed, about 1¼ inches in diameter, heavily mailed with broad, sharp-pointed scales, and raised out on a long, stout stem, 2 to 3 inches long, soon curving downwards.

All the other species have cones which are more or less elongated from the start. Yearlings of the Broken-Cone Pines are at first tawny gray or purplish, oblong, about ¾ inch, becoming ovate the second season. Yearlings of Big-Cone are oblong, 1 to 1¼ inches long, raised on stout stems 2 to 3 inches long, and formidably armed in youth with stout, radiating spines. Cones of Monterey and Narrow-Cone Pine are at first oblong and tawny gray, on stems about ½ inch long, becoming attenuated to a point at apex during the next season. Yearlings of the Long-Cone group and of Rocky Mountain White Pine are long-oblong from the start, becoming greatly elongated during the second season, when they are bent downward on their flexible stems 2 to 4 inches long. Yearling Plume-Pines are purple, oblong, ¾ inch long, and retain their form next season, on stems ½ inch long. Cones of the alpine White-Bark Pine arise out of the dense tufts of leaves about half an inch, and are fairly glittering with marine-blue scales.

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RECAPITULATION OF THE GROUPS OF PINES.

Genus PINUS—True Pines.

Sub-Genus Strobus,—Soft Wood or White Pines.

Group 1. Long-Cone Lumber Pines . . *Elongatæ*
" 2. Alpine White Pines . . . . . *Alpinæ*

Sub-Genus Pinaster, Hard-Wood Pines.

Section 1. Sub-terminal-coned Pines . . *Terminales*

Sub-Sec. 1. Short-Leaved Pines . . *Brachyphyllæ*
Group 1. True Nut Pines . . . . . *Edules*
" 2. Plume-Branched Pines . . *Plumosæ*
" 3. Thimble-Cone Pines . . . *Parviconæ*
Sub-Sec. 2. Broken-Cone Lumber Pines *Fracticonæ*
Group 1. Common Lumber Pines . *Communes*
" 2. Little-Known Pines . . . . *Novitates*

Section 2. Lateral-Coned Pines . . . . *Laterales*
Group 1. Heavy-Coned Pines . . . . *Graves*
" 2. Closed-Cone Pines . . . . *Serotinæ*

Genus CEDRUS—Link.

THE TRUE CEDARS.

Trees with cones (maturing in two years), erect, large, depressed at the ends; the leaves short, slender, mostly tufted and persistent several years from the ends of undeveloped branchlets (spurs).

Three Species. Natives of the mountains of western and central Asia and northern Africa. Successfully grown in the Pacific slope states, and placed here to complete the classification.

Class B.—DECIDUÆ.

DECIDUOUS-LEAVED FASCICULARS.

Trees with small, slender leaves, mostly tufted on the ends of short branchlets, peculiar for being promptly deciduous; cones (maturing in one season) small, pendent from the sides of branches of the previous season's growth.

Two Genera—the Larches:—

Second Genus, LARIX—Link.

TRUE LARCH OR TAMARACK.

Trees with cones pendent on branches of the previous season's growth; leaves promptly deciduous.

Two species in Northwest America:—

No. 1—Woolly Larch - *L. Lyallii*, Parlatore.

Small alpine trees of the Cascade and Galton Ranges, and eastward to the Rocky Mountains, at elevations of 6,000 to 7,000 feet. Branchlets and cones clothed with whitish hairs; the cones promptly deciduous—a rare feature of Larch cones.

No. 2—Western Larch - *L. occidentalis*, Nuttall.

Large, usually tall trees of the Northwest, on high or dry situations; peculiar for their thick bark, like a Yellow Pine, and cones bristly with long, exserted bracts.

Scattered through the Selkirk and Gold Ranges, thence southward along the eastern slopes of the Cascade Range to Mt. Hood; also in the Blue Mountains and on the cross ranges to the Rocky Mountains.

The excessively thick and spongy bark of this tree resists the first kindling of forest fires, hence the tree is often preserved in the midst of devastation.

PSEUDOLARIX—Gordon, the False Larch, is a genus of one species, native of Northern China, with cone-scales extended at the points and promptly deciduous from the cone-axis—in this respect totally unlike true Larches.

Sub-Tribe Two.—SOLITARIÆ.

THE SOLITARY-LEAVED PITCH-TREES.

Trees with all the leaves solitary, not in fascicles nor tufted, and all very short. Cones maturing in a single season.

Separated by the direction of the cones into two classes:—

Class A.—PENDENTES.

PENDENT-FRUITED SOLITARES.

Trees with fruit pendent from or near the end of the branchlets. The leaves of the two first genera promptly deciduous from the branchlet when drying.

Male flowers, oblong, ½ to 1 inch long. Three closely related genera, often considered as one polymorphous genus, but clearly distinct. The Spruces.

Two sections:—

Sec. 1. Naked-Coned Pendants—*Inclusæ.*

Cones terminal, the bracts short, concealed at maturity by the cone-scales. Male flowers terminal, like the cones. Two genera:—

Third Genus, PICEA—Link.

THE TRUE SPRUCES.

The branchlets of the True Spruce are rough from the presence of prominent leaf-bases that become hardened and persistent; the cones are terminal on leafy branchlets; the bracts are smaller than the scales; the leaves are sessile (*i. e.*, not narrowed into stalks at base), keeled on both upper and lower sides, and with two lateral resin ducts from end to end; the seeds are without resin vesicles. Male flowers solitary, and

axillary or terminal. Sixteen species, five in Northwest America.

Two groups:—

Group 1. Interior Species.

No. 1—**White Spruce** - - *P. laxa*, Sargent.

Trees of far Northern regions, including the valley of Yukon River, with glaucous or white leaves.

No. 2—**Blue Spruce** - - *P. pungens*, Engelm.

Rocky Mountains and westward to Wyoming, along streams. Remarkable for its sharp and very glaucous leaves.

No. 3—**Engelmann's Spruce** - - - *P. Engelmanni*, Engelm.

Rocky Mountains and westward to the Northwest regions. Branchlets short and usually slender; cones elliptical, 2 to 2½ inches long. Abundant on the Rocky Mountains, extending to the Cascade Range, but not reaching California. Appearing again in Northern Arizona.

ARIZONA SPRUCE. Var. *Franciscana*. n. var. *

More robust but not as lofty trees, with long-retained lower limbs, and stout, short branchlets, ¼ of an inch thick, and larger cones, scales, seeds, etc.

* New variety, not before published.

At elevations of 9,000 to 11,000 feet on the slope of the San Francisco Mountains, Northern Arizona.

Group 2. North-Coast Species.

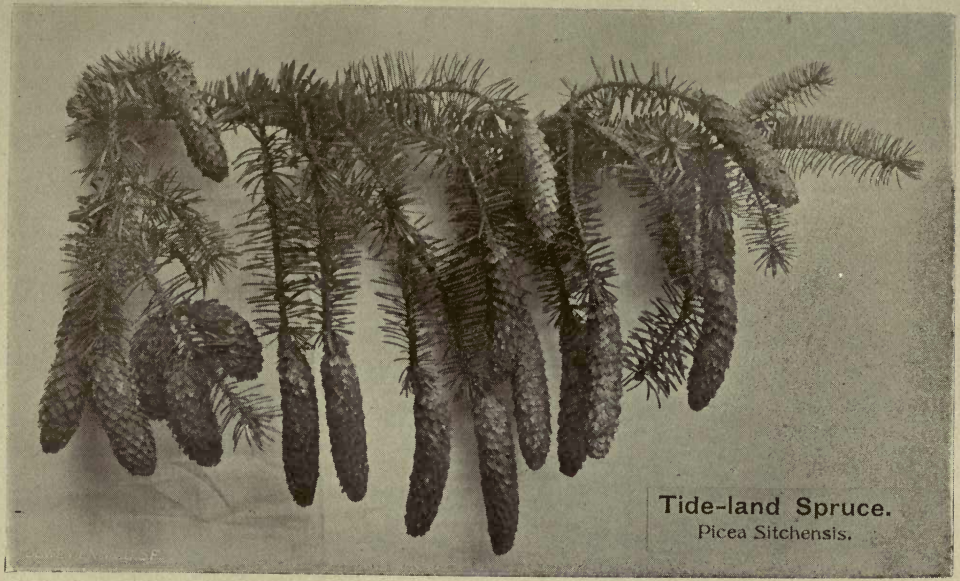
No. 4—**Tideland Spruce** - *P. Sitchensis*, Carrière.

Abundant in the Northwest, and reaching the coast of California. Large trees, with slender branchlets and cylindrical cones, 1½ to 2 inches long. Trees often attaining a great size, 150 feet high and 15 to 20 feet in diameter. A valuable timber tree, and very beautiful as a lawn ornament.

No. 5—**Weeping Spruce** - *P. Breweriana*, S. Watson.

A recent discovery, stranded near the summits of the Siskiyou Mountains, with a few on the near mountains northward. Branchlets very long, slender and pendent, 8 feet or more; cones tapering to each end, and 2 to 3 inches long.

Trees of great beauty and destined to be much used for decoration.



No. 8. Characters of the Naked-cone group of the short and solitary-leaved, Pendent-coned trees—The True Spruces.

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Fourth Genus, TSUGA—Carrière.

THE HEMLOCK-SPRUCES.

The branchlets of the Hemlock-Spruce are rough like the True Spruce; the cones are also terminal, very small; the bracts are similar; but the leaves are petioled (*i. e.*, narrowed at base into a foot-stalk), and they each have a single resin-duct on the back; the seeds are provided with resin vesicles on the upper surface—in this respect resembling the Fir. Male flowers at the end or distributed along the short branchlets. Six species, 2 in Northwest America:—

No. 1—**Western Hemlock** - *T. Mertensiana*, Carrière.

Picturesque trees of the Northwest, reaching Northern California. Cones decorating the short branchlets, ovate, ½ inch long. Branches long, drooping, with flattened, fan-like branchlets and short, linear, light green leaves, about ½ inch long, mostly in two ranks.

No. 2—**Alpine Hemlock** - *T. Pattoniana*, Engelm.

Alpine or subalpine trees of the Sierra, Cascade and Rocky Mountains, often attaining a large size, 3 to 6 feet in diameter, and retaining their limbs—these, especially the upper ones, gracefully drooping and profusely decorated with the large, purple, pendent cones, 1½ to 3 inches long.

This lovely Hemlock is peculiarly characterized by its alpine habitat, its cones larger than any other Hemlock-Spruce, 2 to 3 inches long, oblong-cylindrical; scales numerous, nearly of the same size, usually reflexed at maturity, broader than long, 4 to 8 lines wide, striate, with thin, wavy, rounded border; bracts small, spatulate, 3 to 4 lines long; seeds angular, with resin vesicles; wings elliptical, 3 to 6 lines long; leaves linear, about ½ inch long, dark green, scattered, or tufted at the ends of short branchlets, quadrangular, keeled above and below; resin duct solitary and large. Pollen grains bilobed, unlike the other Tsugas.

This tree has so many peculiar characters that the author of this volume published it (3d Rep. Cal. Board Forestry, p. 126) as the type of a distinct genus—*Hesperopeuce*.

HOOKER'S HEMLOCK—Var. *Hookeriana*. n. var.*

Abies Hookeriana—Murray.

Smaller, usually tall, slender, pinnacle-shaped trees, with short, drooping branches, and smaller cones, 1½ to two inches long, the scales at maturity less spreading and less striated. Alpine regions of the Cascade Range, and eastward along the cross ranges to the Selkirk and Gold Ranges, and the Northern Rocky Mountains.

* New variety, not before published.

Sec. 2. Feather-Coned Pendants.

Exsertæ.

Cones sub-terminal, arising just below the leading buds, the three-parted, feather-like bracts greatly developed and protruding from between the cone-scales. The buds of both kinds, leaf and flowering, are remarkably large, with few large, brown, shining scales, Male flowers sub-terminal from the axils of last year's leaves.

One Genus, peculiar to Western America:—

Fifth Genus, PSEUDOTSUGA.

Carrière.

THE FALSE HEMLOCK-SPRUCES.

The branchlets of the False Hemlock-Spruce are smooth, the flat leaf-scars transversely oval, the leaves petioled (*i. e.*, narrowed at base), the bracts of the cones are three-parted and much longer than the scales (*i. e.*, they are exserted from between the scales of the cone, like feathers), and the seeds are devoid of resin vesicles. Male flowers large, distributed along the branchlets in last year's leaf-axils. The leaf and flower buds are remarkably large.

In a few respects this last genus approaches the Firs; they have similar smooth branchlets and exserted bracts, thus justifying their arrangement next to the great family of Firs. Two species:—

No. 1—**Douglas Spruce** - *P. taxifolia*, Britton.

Pinus Taxifolia, Lambert, 1803.
Pseudotsuga Douglasii, Carrière, 1855.

Large and valuable lumber trees of the Northwest; forming the larger part of the great forests about Puget Sound and southward. Cones narrow, 2 to 3½ inches long, the feather-like bracts protruding ½ to ¾ of an inch. Trees near the coast northward, and crowded into groves remain slender, and become very tall, 300 to 400 feet high, and are largely used for piles and for ship masts and other timbers. In other situations, especially interior and southward, they become large-bodied trees, 10 to 12 feet in diameter, with thick, hard, black bark, divided by deep furrows into large, longitudinal sections.

PECULIARITIES OF THE DOUGLAS SPRUCE.

The Douglas Spruce is the most extensive of the special products of the favoring conditions of the Northwest, being a component part of, and precisely co-extensive with, this great forest development in all its extent from the Pacific Coast to the Rocky Mountains, and from British Columbia to Mexico. No other tree is more util-

No. 9. Characters of the pendent, Feather-coned, or leaf-decorated, False Hemlock-Spruces.

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ized in the West, where cheap, strong, durable lumber is desired. This is one of the first and most valuable discoveries of David Douglas, on the Columbia River, 1825, and it was early named for him as *Pinus Douglasii*, subsequently changed to *Abies Douglasii*, and now, although both the generic and specific name have suffered another change, Douglas' name is properly retained for the English name of this noble tree. The Douglas Spruce has fared badly in the matter of an English name until recently, being in some localities called "Yellow Fir," if the lumber happens to have that tint, or "Red Fir" when of a darker color; but, worse than that, some lumber dealers have called it "Oregon Pine."

CORK-BARK DOUGLAS SPRUCE. Var. *suberosa*, Lemmon.

Small trees with whitened, thick, corky bark, thin foliage, and small, ovate cones, 1 to 2 inches long. On mountains of Northern Arizona and New Mexico, at elevations of about 9,000 feet. 1892.

No. 2—**Big-Cone Spruce** - *P. macrocarpa*, Lemmon.

P. Douglasii, Carr. Var. *macrocarpa*, Engelmann.

Trees less symmetrical, longer-limbed, and never attaining the size of the other species; cones remarkably large, 5 to 7 inches long, 2 to 3 inches thick (when opened), the large scales more convex and firmer than the other species, and having twice as large seeds, with $\frac{1}{2}$-inch wings. Quite local on the San Bernardino and neighboring mountains of Southern California.

Class B.—ERECTES.

ERECT-FRUITED SOLITARES.

True Firs and Their One Ally.

Noble trees with branches mostly in horizontal whorls or circles; cones mostly erect upon the uppermost limbs, the scales deciduous.

Two genera, Abies and Keteleeria, the latter a curious genus of three species, local in China, the other (Abies) a large genus widely distributed.

Sixth Genus, ABIES—Link.

THE TRUE FIRS.

Mostly magnificent trees with branches arising in symmetrical, horizontal whorls and forming fan-like strata of dense foliage; the leaves very short, mostly two-ranked on young trees and lower branches, but erect and crowded along the upper side of upper branches. Cones erect, lateral, sessile, nearly cylindrical, axillary from the upper side of mostly the

upper limbs; the scales deciduous, leaving the axis of the cone standing on the branchlet.

Male flowers from the axils of last year's leaves, oblong, becoming pendent, profusely decorating the under border of the fern-like branchlets.

The wood of the firs, while not so valuable, generally, as the Yellow and White Pines, is quite strong, and is used for bridge timbers, some of the species for piling, for interior finish, and for cooperage. Being odorless it is well adapted for butter and fruit boxes, etc.

The Firs of Northwest America may be considered in two groups—Large-cone and Small-cone Firs.

ENGLISH NAMES FOR THE GROUPS AND SPECIES.

Before classifying and describing our western species, the great difficulty of selecting the best, *i. e.*, the correct and shortest English names for them, may be discussed.

The leaves of many species of Fir, both in the Old and New World, are striped beneath with a double set of long lines of white stomata or breathing pores, giving the foliage a glistening sheen of silver, and winning for such firs the name from antiquity of "Silver Firs." Each of our two groups—Large-cone and Small-cone—has two Silver Firs in it. *Abies magnifica* and its marked variety or sub-species, *Shastensis*, are in the Large-cone group; while A *concolor*, and its marked variety, *Lowiana*, are with the Small-cones.

The two first mentioned have very striking, madder-red bark (detected when cut or broken), winning for them

the additional name of "Red Firs." The other two forms named, together with two other northern species, have, usually, whitish bark outside; these are the so-called "White Firs."

Now these three terms, "Silver," "Red," and "White," when applied to a group of firs, are not, each, associated with a set of other distinctive characters—such as separate the Large-cone from the Small-cone group. Each of them, in fact, crosses the line both sides and invades other groups quite arbitrarily and without any support; hence, "Silver," "Red," and "White," taken alone, do not discriminate between groups and are useless terms for classification.

In order to distinguish a species absolutely, we may use the translated botanical names, which are the better ones in four instances—Grand, Lovely, Noble, and Magnificent—while the remainder may receive the double names, Sub-Alpine, Shasta Red, California White, Colorado White, and Bristle-cone Fir.

Group 1. Large-Cone Firs.

Megacarpæ.

Species with bark reddish within (though it may be white or black outside); cones mostly large, 4 to 8 inches long; leaves short, not twisted at base. Male flowers about ½ inch long, dark red. Four species:—

No. 1—**Sub-Alpine Fir** - - *A. lasiocarpa*, Nuttall.

Rare on high peaks of the Northwest. Bark thin and milk-white outside; cone small, 2 to 3 inches

long, scales bearing short, brownish hairs; leaves small and very short. Male flowers red, showy.

No. 2—**Lovely Fir** - - *A. amabilis*, Forbes.

Rare trees on peaks near the Cascades of the Columbia, and northward to Fraser River. Bark gray, thin, 1 to 2 inches; cone 3 to 4 inches long; cone bracts short, concealed; leaves flat and crowded. Male flowers crimson, and conspicuous.

No. 3—**Noble Fir** - - - *A. nobilis*, Lindley.

Rare, often very large trees near Mt. Hood, and in a few other northern localities. Bark brown, 1 to 2 inches thick; cones 4 to 6 inches long, the bracts large, long, exserted and reflexed like feathers.

Extensively manufactured in Washington and Oregon under the absurd name of "Larch." Highly prized for interior finish, furniture, etc.

No. 4—**Magnificent Fir** - *A. magnifica*, Murray.

Attains the largest size of any tree of the genus; on high plateaus and mountains of California. Cones largest of the genus, 6 to 8 inches long; bracts mostly concealed; leaves quadrangular, whitish beneath. Male flowers very conspicuous. Bark very thick, becoming 4 to 6 inches on largest trees, dark red inside, detected best when cut or broken; hence often called "Red Fir," though the bark outside is usually very dark. Also called "Silver Fir," on account of

its whitened leaves. Valuable timber trees; wood durable in contact with the soil, hence much used for bridge timber, etc.

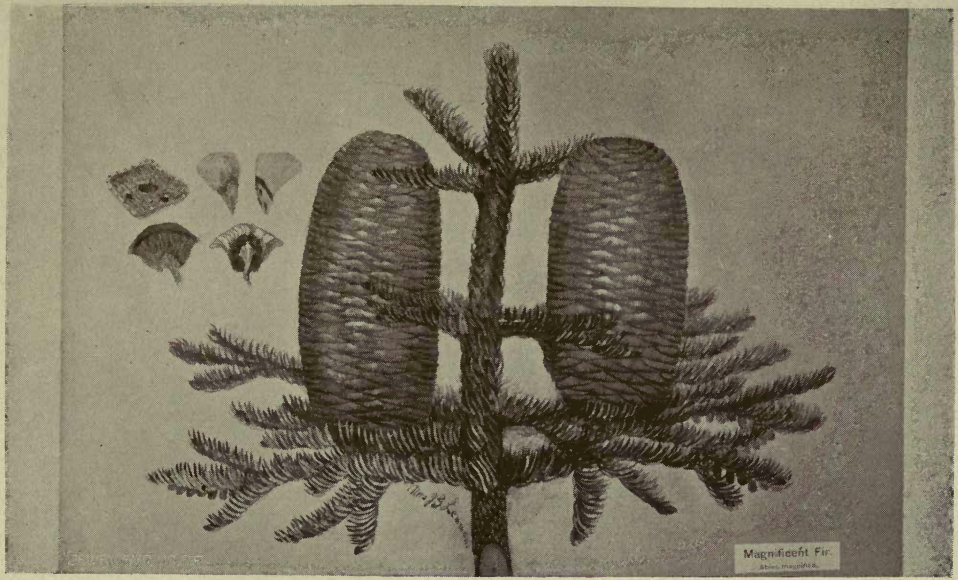
This beautiful "Queen of the Sierra" is most regular in youth, with its verticils of branches maintained in perfection until age, if favorably situated, and becoming a noble tower of stratified foliage 150 to 300 feet high. The leaves are so short and close wrapped, the branchlets so numerous and regularly placed as pinnæ along the broad, almost contiguous sprays, that the light of day is but partially admitted; and the visitor to a Fir forest, in looking upward, gazes through veil after veil of airy, gauzy, reticulated sprays that give an impression of beauty and grace it is believed that transcends anything elsewhere seen in the vegetable world.

SHASTA FIR. Var. (*a*) *Shastensis*, Lemmon.

This variety forms a large, almost exclusive forest on the high plateau of lava thrown out by Shasta in former times. A few trees are scattered, also, over the high slopes of Mount Eddy, Scott, Trinity and Siskiyou peaks, at elevations of 6,000 to 8,000 feet.

The peculiarity of this variety of Fir, aside from its locality, is connected mostly with the fact of its cone-bracts becoming long and protruded, a half to a full inch between the scales, rendering the large purple cones, thus decked out with tasseled fringes, a most beautiful object. Male flowers equally showy, as they fringe the bearing branches with large crimson pendants.

The trees are very large and lofty, though not so immense and high-headed as in the typical southern form,



No. 10. Characters of the Large-coned group of the short and solitary-leaved, Erect-fruited trees—The True Firs.

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but they become, on the southern slopes of Shasta, a dark, gloomy assemblage of massive black trunks, colored on the north side from base to the limbs with bright yellow lichen, or tree-moss, the lower limbs draped here and there with long, sweeping festoons of black, filmy lichen, giving a funereal aspect to the whole scene, scarce relieved by the twitter of a red squirrel, the long, wailing note of a woodpecker, or the occasional cry of a bald eagle.

GOLDEN FIR. Var. (*b*) *xanthocarpa*, Lemmon.

Smaller, more symmetrical trees than the typical, and bearing smaller cones, averaging 4 to 5 inches long, half as thick near the base, tapering slightly to the apex, of a golden color until maturity (suggesting the name from the Greek *xanthos*, yellow), the scales, seeds, and seed-wings proportionately smaller. In high, sub-alpine localities, Mt. Shasta to Mt. Webber and Mt. Whitney.

Group 2. Small-Cone Firs.

Microcarpæ.

Cones smaller, 2 to 4 inches long; bark whitish within, though often brown or even darker outside; leaves longer, mostly flat, and twisted one-half round at base. Male flowers smaller, yellow.

Three Species:—

No. 5—**Grand Fir** - - *A. grandis*, Lindley.

Becoming large trees of the Northwest, very

abundant in Washington and Oregon, and reaching California; cones narrow, 2 to 3 inches long; leaves dark green and shining above, white-lined below. Bark mostly thin, finely checked, and dingy-white outside, often quite dark.

No. 6—**Colorado White Fir** - *A. concolor*, Lindley.

Summits of the watershed of the Colorado River, including Wyoming, Colorado, Utah, New Mexico and Arizona, also a few trees in Lower California. Leaves large, whitened both above and below. (One of the "Silver Firs.") Bark usually whitened outside. Cones smaller.

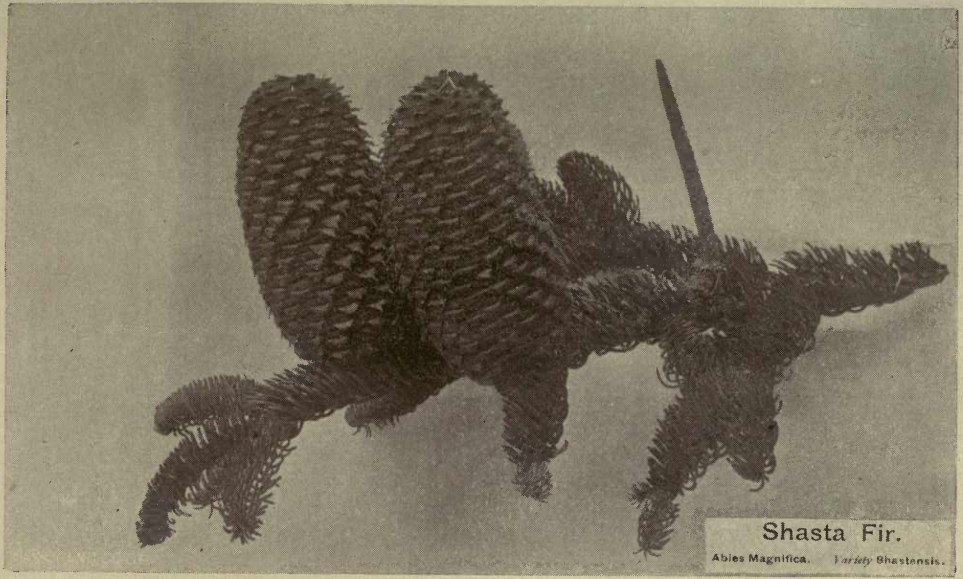
California White Fir. Var. *Lowiana*, Lemmon. *Pinus Lowiana*, McNab.

Becoming large trees, common in the California mountains at middle altitudes. Leaves whitened below; bark very thick, deeply furrowed and dark, often nearly black outside.

Manufactured into butter boxes, firkins, etc., where a scentless wood is desirable.

No. 7—**Bristle-Cone Fir** - - *A. venusta*, Sargent. *Abies bracteata*, Nuttall.

Extremely local, stranded high up in the Santa Lucia Mountains of California. Cone-bracts with the large midribs long, exserted, like stiff bristles, 1 to 2 inches long; leaves very large and long. Only



No. 11. Characters of the Feather-coned or Decorated Firs; also showing cone-axis persistent on the branch—the scales and seeds having fallen away at maturity.

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a few trees, tall and very symmetrical, in Miller's and neighboring cañons.

SYMMETRY OF THE FIRS.

No more prim, symmetrical, absolutely conventional trees are found in the Conifer family than the Silver Firs of California. Young trees of the same age are generally of the same size, the circles or whorls of branches are wide at the base and diminish regularly to the conical apex, each whorl of branches composed of several members—usually five—each throws off pinnæ, right and left, annually, these repeating the process again and again, the whole branch simulates the compound frond of a graceful fern. At about fifty years a great change comes. Cones, like little caskets, appear, erect, in a small circle upon the topmost branches of the previous year. Simultaneously, the lowest whorl of branches dies and falls away. Life and death are fakes. Each year a new whorl is added at top and withdrawn at base; but death is the speedier angel, and often two or more whorls are removed each year. As the noble trees in a dense Sierra forest arise 200 to 300 feet, the great columnar trunks are always shorn of their limbs to the very crown. This crown is seldom invaded; it preserves its domed integrity inviolate through the centuries, always decorated, in the season, with hundreds of royal-purple or burnished-gold caskets, in graduated circles—not a branch awry nor a casket missing—architectural precision and regal splendor magnificently displayed in the silent depths of the pathless woods.

Tribe Two.—ARAUCARIEÆ.

SOUTHERN PITCH-TREES.

Mostly lofty trees, with branches in symmetrical whorls; flowers dicœcious (male and female on separate trees); cones large, globular, or ovate; scales numerous, arranged spirally, deciduous, united with the bract, and each bearing but one seed.

Three Genera: *Araucaria*, *Agathis* (*Dammara* of authors), and *Belis* (*Cunninghamia*). All natives of South America and the South Pacific islands. Many species successfully cultivated on the Pacific Coast.

(Mentioned here to complete the classification).

Tribe Three.—TAXODIEÆ.

THE TAXODIADS.

Less resinous than the two preceding tribes, but, like them, differing fundamentally from the next (*Cupressinæ*) in having spiral cones, leaves, etc.

Cypress-like trees, including those of the largest

size; abundant in past ages of the earth, a few species only now extant. The leaves are scale-like or linear; cones (maturing in one season) globular or oblong, woody; seeds 2 to 6 on each scale, narrowly winged. Two classes:—

Class A.—SEMPERVIRENTES.

EVERGREEN TAXODIADS.

Trees retaining their leaves alive during several years.

Four Genera: *Sequoia*, *Cryptomeria*, *Agathis*, and *Sciadopitis* (the three last named not native to Western America but often met with in cultivation). One genus, peculiar to California:—

Seventh Genus, SEQUOIA—Endlicher.

CALIFORNIA REDWOODS OR BIG TREES.

The largest and most magnificent trees known; peculiarly confined to the limits of California. Cones woody, globular, of nearly equal-sized scales, arranged in three coils, and diverged at right angles from the

axis; thick and ob-pyramidal, shrinking a little when ripe, and discharging the numerous seeds, but not changing position. Male flowers, yellow, about ½ inch long, terminating short branchlets. Male flowers, as well as cones on scaly peduncles ½ to 1½ inches long. Trees of great size with very thick fibrous bark, deeply furrowed longitudinally, and peculiar, reddish, very valuable wood. Twenty-five extinct Species; two survivors:—

No. 1—**Coast Redwood** - - *S. sempervirens*, Endl.

Famous lumber trees of California, growing only near the ocean in numerous groves from Monterey Bay to the Oregon line. Cones the size of a boy's marble; leaves linear, about half an inch long, in two ranks, the longest leaves in the middle of the growth of the season, giving an elliptical form to the flat branchlets, a feature common to other two-ranked leaves, but most conspicuous in this redwood. The peduncles of both male flowers and cones are about an inch long and clothed with short scales, in striking contrast to the leaves; the end portion of each branchlet similarly clothed with short scales, grading into the elliptically-disposed, linear leaves of the branchlet

TENACITY AND VALUE OF THE SEQUOIAS.

The Coast Redwood is unequaled in the Conifir family for tenacity of life. Stumps freely sprout from the

base, in time reforesting the region, while trees of any age throw out branches from adventitious buds in their bodies, even from the fire-denuded heart-wood.

The felling of monster redwoods of both the Coast and Sierra species, and the manufacture of their trunks into lumber, by the use of modern machinery and appliances, afford examples of the most stupendous lumber operations ever witnessed; but alas! the end is near. At the present rate of destruction not an unprotected Sequoia of lumber-producing size will be left standing twenty years hence.

No. 2—Giant Sequoia - *S. gigantea*, Decaisne.

Gigantic trees, limited to a few groves in the high Sierra from Placer and Calaveras Counties to Kings County. Trees not sprouting from the base or adventitious buds, as in the other species. Cones about the size of a hen's egg; leaves scale-like, scattered. This matchless "Big Tree" (often miscalled Wellingtonia), is abundant in cultivation up and down the coast as well as abroad, and is so well known that further description is not needed, but it may be stated briefly that trees in the Sierra have been determined to be 300 to 400 feet high without a limb for 150 to 200 feet, and 30 to 40 feet in diameter, while their age must be 1,500 to 3,000 years. Trees of the preceding generation (as shown by their stubs) seem to have attained a life period of 4,000 to 5,000 years, and all present trees have the appearance of vigorous

youth, with full crowns of limbs, and seldom a hollow heart or decrepit trunk.

CRYPTOMERIA JAPONICA.

A tree much in cultivation in California, and nearly related to the Redwoods, is *Cryptomeria Japonica*, or Japan Sacred Cypress; so close is the resemblance to a young Sequoia that it is often mistaken for our "Big Tree," having the same general appearance, the swell of the trunk near the base, and finely divided branches; but the trees come to fruit-bearing when young, with large quantities of small, globose cones, clothed with free, subulate scales, and the leaves are awl-shaped and succulent, like those of the Norfolk Island Pine.

Class B.—DENUDÆ.

BALD TAXODIADS.

Trees with small, tender, deciduous leaves; cones embossed or reticulated. Two Genera, neither in Western America. *Glyptostrobus*, the Embossed Cedar, with beautifully sculptured cones, is a native of South China.

Taxodium (largely present in early ages) is represented by one species in the Southern States, and a second in Mexico. This is the celebrated "Bald Cypress," of the Southern swamps, and is particularly noted for its "knees"—conical bodies rising from its roots, to a height of 2 to 4 feet.

No. 12. Characters of the Evergreen group of the Spiral-coned Big-Trees or Taxodiads.

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DIVISION II.

VERTICILLATÆ.

THE VERTICILL-CONE TREES.

Cone-bearing trees with circular (verticillate) development, *i. e.*, their leaves, bracts and cone-scales arise from the stem or cone-axis, in horizontal whorls (verticills) of twos—always opposed—or circlets of three (ternate). Male flowers globose, 2 to 4 lines long. Cones (*Cupressus* excepted) requiring but one season to mature.

Embraces two tribes:—

Tribe One.—CUPRESSINEÆ.

CYPRESSES AND THEIR ALLIES.

This tribe includes a large number of genera and species of slow-growing trees, most of them in the

Old World and Australia, with four genera in the United States, comprising ten species, nine of them in Northwest America. The wood of all these trees is more or less fragrant and pungent; the leaves, small and scale-like; the cones small, with scales valvate or peltate. They are represented in America by two pairs of closely-allied genera:—

First Pair, The Arbor-Vitæ. *Thuinæ.*

Spire-shaped trees, with cones oblong and scales flat, convex, or thickened; branchlets with sprays of foliage flattened horizontally, and decurrent leaves of two forms. Two genera:—

Eighth Genus, THUYA—Linn.

TRUE ARBOR-VITÆ.

Fertile scales 6, unequal in size, thin; seeds 12. Two species in America (called Cedars), one in the Eastern States, the other in the Northwest. Heartwood reddish.

No. 1—Pacific Red Cedar - - - -

Th. plicata, Lambert, 1803.

Th. gigantea, Nuttall.

Noble trees, with headquarters of greatest development around Puget Sound. Apt to taper rapidly

from a thick, hollow base, hence defective for wide lumber, but highly prized for dugout boats; also the wood, being very durable, is largely used for shingles, clapboards, etc.

Ninth Genus, LIBOCEDRUS—Endl.

INCENSE CEDAR.

Cones oblong, $\frac{3}{4}$ to 1 inch long; fertile scales 2, equal in size, thick, convex; seeds 4, long-winged.

No. 1—**Post Cedar** - - *L. decurrens*, Torrey.

Beautiful and very valuable trees of California mountains. Most of the trees affected within by a fungus—dry rot—which, however, does not materially injure the timber for use as posts, ties, etc.

Two oriental genera: *Thuyopsis* and *Biota*, belong to the same group (Arbor-Vitæ), and are often found in cultivation on the Pacific Coast, being small, pyramidal trees, with close foliage, often beautifully variegated.

Second Pair, True Cypresses.

Cupressi.

Cones globular and the scales ob-pyramidal and peltate, frequently with prominent bosses or ears, the vestiges of the reduced scale-tips. Heart-wood yellowish. Two genera:—

Tenth Genus, CHAMÆCYPARIS.

Spach.

FLAT-BRANCHED CYPRESSES.

Very graceful Northern trees, branchlets forming flat, horizontal sprays of foliage, and leaves two-ranked; cones very small, ¼ to ½ inch thick, maturing in one year; seeds few, narrowly winged. One species in the Eastern States, two in the Northwest:—

No. 1—**Alaska Cypress** - *Ch. Nutkænsis*, Spach.

Abundant around Puget Sound and northward on the islands and peninsulas of Alsaka. Branchlets strongly declined, giving the tree a dejected appearance. Timber a bright, clear yellow, highly prized for cabinet work, and often called "Alaska Cedar."

No. 2—**Lawson Cypress** - - *Ch. Lawsoniana*, Parlat.

Most beautiful of ornamental trees, with its fan-like, horizontal or declined sprays of foliage, and, in the season, its numerous small globular cones. Much in cultivation on the Pacific Slope. Timber light cream color, very serviceable, with a satin gloss and a pungent, aromatic odor. Known in Oregon as "Port Orford Cedar."

No. 13.- Characters of the Flat-branched, Arbor Vitæ group of Cypress-like trees.

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Eleventh Genus, CUPRESSUS.

Linn.

SPIRE-BRANCHED CYPRESSES.

Trees or shrubs with branchlets spire-shaped, not flattened as preceding genus; cones larger, requiring two years to mature; seeds numerous, 6 to 20 to each scale, leaves not in two ranks, but scattered; trees yielding without injury to treatment with pruning shears, hence much used for hedges, windbreaks, and for ornamental effects. Five species, in two groups:—

Group 1. Southern Cypresses.

No. 1—**Guadalupe Cypress** - - - -

C. Guadalupensis, S. Watson.

Small trees, native of Guadalupe Island off the coast of Mexico, Peninsula of California, and the coast of San Diego County, California. Branchlets slender, drooping, light green; the bark, flaking off, leaves a claret-red surface to the limbs.

No. 2—**Arizona Cypress** - *C. Arizonica*, Greene.

Becoming large trees on the highest peaks of the Arizona mountains, the bark of the large limbs flakes

off, leaving a dark red surface. Branchlets erect, short, stout, and distinctly quadrangular, caused by the closely-appressed leaves in four ranks; cones about ¾ inch in diameter.

BEAUTIFUL CYPRESS. Var. *bonita*. n. var. *

Beautiful trees of much lower stations, being found on moist lands along the mouths of mountain streams; the trunk and limbs not the least decorticated.

Abundant and of large size in Bonita Canyon, Chirricahua Mountains, Southeast Arizona.

Group 2. Californian Cypresses

No. 3—Monterey Cypress

C. macrocarpa, Hartweg.

Familiar hedge-making trees, indigenous upon Point Pinos, near Monterey, where the cutting winds from the ocean have fashioned the old slow-growing trees into fantastic shapes. Cones the largest of the genus, about an inch thick. Seeds black.

No. 4—North-Coast Cypress

C. Goveniana, Gordon.

Rare, shrubby trees from Monterey Bay northward to Mendocino. Foliage pea green; cones small, of scales; seeds dark. Abundant on Mt. Tamalpias near San Francisco.

*New variety, not before published.

No. 14. Characters of the Spire-branched group of the globe-coned, True Cypresses.

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PIGMY CYPRESS. Var. *pigmæa.* n. var.*

Shrubs or small trees, from 4 inches to 10 feet high, but whatever the size, freely-bearing and often retaining the cones through many years; cones small, about ½ inch thick, of few scales and seeds. Sparsely found on the ashen "White Plains" back from the coast, near Mendocino.

No. 5—California Mountain Cypress

C. Macnabiana, Murray.

Large trees or tall shrubs branching from the ground. Branchlets numerous, slender; foliage dark green; cones very small, little more than ¼ inch in diameter, with prominent bosses or scale vestiges. Seeds light brown. Near Ukiah, and on Red Mountain northward to vicinity of Mt. Shasta.

Another group, *Callitrinæ*, the brittle-stemmed Cypresses, with five genera, is sparsely represented in cultivation by several species of Frenela, Actinostrobus, and other curious little trees.

Tribe Two.—JUNIPERINEÆ.

THE JUNIPERS.

This, the last tribe of the cypress-like trees, is peculiar in being so compact and uniform a group that,

* New variety, not before published.

though composed of a large number of species, they are all usually regarded as forming one genus, with small, consolidated, berry-like fruit. The berries often show vestiges of scales like ear-tips.

Twelfth Genus, JUNIPERUS.

Linn.

THE JUNIPERS.

Twenty species in the Old World (two of them apparently reaching North America), five in Mexico, and four or five in more northern regions. Heartwood reddish. Flowers often dicœcious.

Three Sub-Genera:—

Sub Genus 1, OXYCEDRUS.

PRICKLY JUNIPERS.

Flowers axillary; leaves in 3's, free and jointed at base, awl-shaped, sharp pointed, whitened above, not glandular-pitted. Berries small, smooth.

Twelve Species; 1 in Western North America:—

No. 1—**Common Juniper** - *J. communis*, Linn.

Shrubs with spreading branches, rarely a small tree; the branchlets thickly armed with half-inch sharp leaves; berries dark blue.

Eastern States and Canada, reaching Northwest America, in British Columbia and Alaska.

CREEPING JUNIPER. Var. *alpina*, Engelm.

A prostrate form of the above that reaches the highest peaks of Western ranges. Leaves one-half inch long, in two ranks, acute; berries small, dark blue, fleshy.

Sub Genus 2, SABINA.

SAVIN JUNIPERS.

Flowers terminal; on short, lateral branchlets; leaves ternate (or opposite) of two forms, mostly scale-like and closely appressed, often glandular pitted. Berries mostly very small and numerous.

Fourteen Species; 2 in Western N. America:—

No. 2—**California Juniper** - *J. Californica*, Carrière.

A shrub much divided from the root; in the Coast Ranges to San Bernardino Mountains, and frequent in the plains of Southern California; berries large, the size of peas, reddish when ripe, dry and sweetish; leaves ternate.

GREAT BASIN JUNIPER. Var. (*a*) *Utahensis*, Engelm.

On the eastern slopes of the Sierra and on the mountains of Nevada and Utah, confined to the Great Basin region. Berries small; branches slender; leaves ternate.

STONE-SEED JUNIPER. Var. (*b*) *osteosperma*, Engelm.

Rare on Guadalupe Island, off the coast of Lower California.

No. 3—**Western Juniper** - *J. occidentalis*, Hooker.

Small trees on the mountains from Eastern Washington and Oregon along the high ridges of the California Sierra to the San Bernardino Mountains, at elevations of 7,000 to 10,000 feet. Berries small, blue-black, fleshy and resinous; timber very valuable for fence-posts, etc.

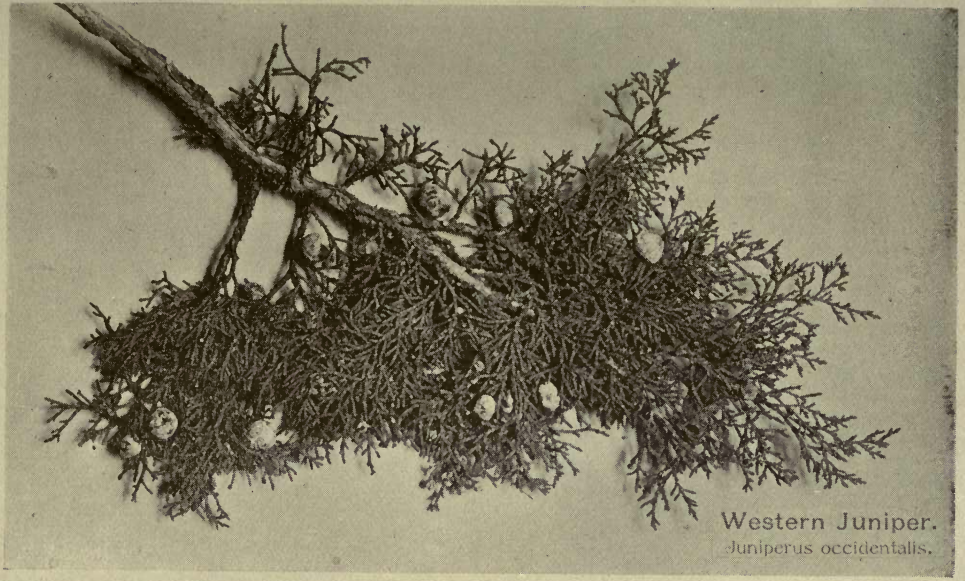
VARIETIES OF WESTERN JUNIPER.

One-Seeded Juniper. Var. (*a*) *monosperma*, Engelm. A form with single, brown seeds. Near the San Francisco Mountains, Northern Arizona, and northward to Colorado.

Double-Seeded Juniper. Var. (*b*) *conjugens*, Engelm. Berries mostly two-seeded, flattened, and emarginate; small trees on limestone hills near El Paso, Western Texas.

(This and the two next varieties are not strictly in our Northwestern region, but included to complete the history of this polymorphous species.)

Naked-Seeded Juniper. Var. (*c*) *gymnocarpa*. n. var. Small round-headed Junipers, abundant on the Sandia Mountains, near Albuquerque, N. M.; with slender branchlets and small, blue-black, abundant berries, the solitary seed, half-exposed at apex—may receive the above name.



No. 15. Characters of the Small-berried group of the True Junipers.

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No. 4—**Virginia Juniper** - *J. Virginiana*, Linn.

Small, conical trees of the Eastern States, reaching Northern Arizona. Branchlets very slender and drooping; berries small, numerous, glaucous, dry. Heart-wood scarlet-red; odorous, compact, and very durable. (Miscalled Red Cedar.)

Sub Genus 3. CUPRESSOIDES.
CYPRESS-LIKE JUNIPERS.

Flowers mostly terminal; leaves in opposite pairs, 4-rowed, scale-like and closely appressed, in the adult plants. Berries more or less angular and with prominent vestiges of the scales.

Ten Species, 1 in Western America:—

No. 5—**Thick-Barked Juniper** - - -

J. pachyphlœa, Torrey.

Trees in Arizona, New Mexico, and Northern Mexico, with thick, hard bark, finely checked like a white oak; berries large and sweetish, much prized by aborigines for food. Unique among the Junipers for its thick, hard, brittle bark.

TAXADS.

SECOND NATURAL ORDER.

TAXACEÆ.

Yews and Their Allies.

This order of evergreens is really very numerous, but as its members are principally in the Old World or the Southern Hemisphere, it does not seem of importance to us of the Northwest. The flowers are diœcious, *i. e.*, male and female on separate trees. The Order comprises four tribes with twelve genera and about ninety species. Two genera only are represented in America, each with a species in the Northwest.

Thirteenth Genus TAXUS—Linn.

THE TRUE YEWS.

These trees are very numerous abroad, with two species in the Eastern States and one in the Northwest. Fruit a small, red, fleshy, sweetish cup, containing a solitary, erect, pointed seed.

No. 1—**Pacific Yew** - - *T. brevifolia*, Nuttall.

Small trees growing along streams of British Columbia, Western Washington, and Oregon, and extending along the California coast to the Santa Cruz Mountains. Leaves small, in two ranks. Wood tough and elastic.

Fourteenth Genus, TUMION—Raf.

Torreya of Arnott.

False Nutmeg.

Singular trees of four species, found in Japan, China, Florida, and California, respectively. Foliage of a heavy, disagreeable odor; fruit resembling the nutmeg of commerce in both exterior and interior appearance, but having none of its qualities. Seed large, solitary.

No. 1—**California Nutmeg**- *T. Californicum*, Greene. (*Torreya Californica*, Torrey.)

Rarely a large tree in the Coast Mountains along streams, and smaller in the Sierra as far interior as Yosemite Valley. Fruit pear-shaped, 1 to 1½ inches long, shining, pendent from near the ends of the branchlets. Leaves large, two to three inches long, 1 to 2 lines wide, flat, acute, shining above, and in two ranks; the longest leaves midway of the season's growth, rendering the many flat branchlets narrowly

elliptical, adding greatly to the beauty of these rare trees.

Coast Nutmeg. Var. *littoralis*. n. var.

The original description of the California Nutmeg being drawn from the small form on the high, dry, western flank of the Sierra, on a line from Downieville to Mariposa, the more robust, often gigantic trees affecting the low, fog-drenched coast from Cape Mendocino to Point Conception, and with fruit large as egg-plums, may be considered as a variety under the above names.

No. 16. Characters of the Plum-fruited group of the Yew-like trees.

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PERSONAL CHARACTERISTICS OF THE CONE-BEARERS.

Comparing the groups of trees, their predominant characters impress the thoughtful observer with the force of distinct attributes, akin to personalities.

The Long-Cone, Lumber Pines

Are embodiments of magnificence, aristocracy, and excellence. Usually lofty and grand, they are also sequestered in choice locations of middle altitudes, admitting to neighborship, but not fellowship, individuals of all sorts, patricians or plebeians, but always carrying their aristocratic heads a little higher and holding out their long, sugar-loaf rolls of resin-embalmed seeds far above the heads of the smaller, shorter-fruited species. Trees yielding abundance of unexcelled material alike to pioneer shakemaker and subsequent lumber manufacturer who has but to level these noble giants to earth to procure a rich endowment.

The Short-Cone, Alpine Pines

Are illustrations of the daring, aspiring, cliff-climbing element in the Pine family. As the four fighting, storm-beaten coast pines battle their way down to the foam-flecked shore of the sea, despite ocean winds or

drifting sands, so these short-coned species climb up to, and cling upon, the bare, steep rocks of alpine peaks, thrusting their flexile stems under the very snouts of glaciers, or pressing with might and main through high passes, though beaten prostrate the while by wind, and entombed half of each year in ice.

The Oblong-Cone, Plume Pines

Are especial representatives of the esthetic, the beautiful, the graceful, in the Pine family. Selecting sequestered, lofty, scarcely-known country seats near the crowned monarchs of the Sierra, embowered by kindred Pine, Spruce, and Fir, they pose on the steep inclines like colossal figures on Nature's easel—exquisite specimens of modern tree-sculpture, decked with emerald garments, and waving plumes, abounding in the double-curve, Hogarth line of grace and beauty, and but half concealing their royal-purple-hued, pendent cones.

The Globe-Cone, Nut Pines

Represent the provident, liberal element in the Pine family. Generally found on low hills or sunny, undulating plains, they spread out their strong limbs, heavily laden, in easy reach of the aborigine; the cones being unarmed, few-scaled, and containing comparatively the largest, most delicious, and nutritious seeds of any trees of the family.

The Thin-Bark, Tamarack Pines

Are the unfortunate, assaulted and impoverished members of the Pine family. Knocked about on the bleak, sub-alpine heights, their limbs attacked by a mistletoe of their own nurturing, which circles and kills the branches; or by a mysterious agent which causes the branches to turn into close coils, clogging the sap and eventually killing the tree; their trunks, meanwhile, attenuated and thin-barked, are attacked at every stage by tree-boring larvæ and bark-eating birds causing pitch to stream from their wrinkled countenances like Niobe's tears, appealing to man for pity. It is interesting to note in this connection, that we derive our most sympathetic of English words, pity, from the Greek's name for the pine tree—Pitys —in allusion to this weeping, pitch-yielding character of the pine trees.

The Broken-Cone, Lumber Pines

Comprise the profuse, cosmopolitan utilitarians of the family of pines. With forms innumerable and individuals widely distributed, they have developed the most adaptable and useful qualities, both in behalf of Mother Nature, in clothing with forests large sections of country, and of man, in furnishing most valuable and procurable lumber and fuel-producing factors of civilization.

The Lone Torrey Pine

Is doubtless the struggling vestige of a once vast forest occupying a far northern region, but, driven southward by the glacial ice, and attempting to return, is now stranded on this hospitable shore; or, as some will declare, these singular trees may be precursors of a coming, aggressive, conquering species destined to reforest the southern coast hills.

The Heavy, Spine-Cone Pines

Present the ponderous, massive, and coarse, also the protecting and defending principles in the multifarious Pine family. Inhabiting hot, scorched regions, contending there with dwarfed oaks and chaparral, these trees are seldom slim and feeble, but rather broadened out and freely branching, ever holding aloft their enormous clusters of fruit. What end is subserved by the exceeding massiveness and the formidable armament of their cones? That it is a special adaptation of conditions to environment, of armament to the needs of battle, we may be sure. Doubtless a thick, strong, hard investment of carpellary scales defends the ovules from intense heat better than would a light one. Then, too (for there's no end of speculation in this direction), it may be these scales are a defense against the attacks of insects that infest, and often render abortive the seed crops of

other soft-scaled pines and the spruces. And the enormous hooks of their cones, do they not defend against the attacks of nut-hunting squirrels, which else might abridge the dissemination, if not compass the extinction, of the race?

The Closed-Cone, Slender Pines

Are the aggressive, conservative, self-sacrificing, but surely propagating group of the wonderful Pine family. They are strategical warriors from antiquity. Obstreperous and tenacious, they intrude upon coveted ground and multiply upon it so numerously that they starve out all other trees and are obliged to stand close together, crowding and fighting, content to be squeezed to slim saplings if only they succeed in lifting but a scant spire of foliage to the sunlight and the wind-gust, in order to elaborate sap enough to bring to perfection their many belts of suspended, wonderful, wooden, sculptured seed-caskets of long-preserved life-germs, to reforest the region upon occasion.

The Pendent-Coned Trees—The Spruces

Are the cosmopolitan frequenters and benefactors of any region wherever graceful forms are required to relieve a landscape from monotony or ugliness; be it the broad intervales of the great Northwest forests, or the otherwise drear summit valleys of surrounding mountains. Rising gracefully from the general earth-

level, their spires of emerald pierce the azure sky with every form of culminating cone and minaret, all decked, especially around the apex, with garlands of lovely pendent fruit in purple or gold, disposed so attractively as to be the despair of connoisseurs in art.

The Upright-Coned Trees—The Firs

Are the symmetrical, law-abiding exponents of visible evolution, adding spray after spray, stratum above stratum, story above story to a vegetable structure of exceptional regularity; the verdure-clad arms in many series, outstretched and joining hands all around, uplift the emerald tunics with scalloped borders draping the hidden form from lowly pediment to airy finial. Standing sentinel on the narrowed shoulders, are the bird-like cones, prim, erect, often feathered, too, like a tropic songster; they watch the changing hues of their mates and note the approach of autumn, when all their fine plumage must drop away piecemeal, and the released treasure of winged germs—the life product of the sacrificing parent—may sail away in spiral flight, to repeat in distant vales, the passing miracle of development.

The Great Sequoias

Are the stupendous, startling, yet conclusive proofs of the power of Mother Nature, when in the mood, to clothe all the earth with colossal vegetation at will; being sole living examples of the prodigious size that

once, at least, characterized the vegetable world, in the eon when monsters swam the sea and giants trod the earth. These few primeval trees, necessarily awe-inspiring, may well appear venerable too; stalking forth from the dim Past, their matchless, columnar trunks crowned with well-nigh everlasting verdure, they lift their shaded brows to the storm blasts of centuries with the persistence and composure of olden gods, while testifying to the present inhabitants of earth, "We are witnesses of your generations."

The American Cedars

Are the everywhere recognized leaders of beautiful forms in vegetable growth, and being withal usually hardy, it is small wonder that no ornamental grounds are considered complete without the sweet presence of these lovely trees. In their native homes—the dense forest or chaparral thicket—you would not, perhaps, deem them remarkable, for they are compelled to abridge their flowing periphery and yield their trailing robes to the pressing environment of ambitious neighbors, but in the protected home of appreciative man, they expand their comely lineaments and pose in lawn and park like animated statuary, the queens of loveliness and beauty.

The True Cypresses

Are the accommodating, self-sacrificing, shears-endur-

ing members of the great family of Cone-bearers. While most trees of this order suffer greatly or die outright upon the application of the knife, the small-leaved cypresses, elaborating the sap through the epidermis of the slender twiglets as well as the scaly leaves, are enabled to withstand the attacks of the hedger, and they readily assume any shape desired. So they allow themselves to be set in long hedge-rows, dressed true to a line, or banked in fire screens and wind-breaks, or they are clipped and trained to shapes of arches, towers, summerhouses, temples, etc., nothing too elaborate, whether beautiful or grotesque, for these gentle trees to imitate.

The Junipers

Are the little economical commoners of this important family. Arising from the midst of miasmatic swamps, thronging on the borders of deserts, or clinging to the rocky sides of mountains, with scant foliage they elaborate their thin layers of wood annually to form close-grained, fragrant, tough, long-enduring timber, while the shining berries are packed with sugar or saturated with turpentine. These humble trees and shrubs are thus in many regions the poor man's best friend.

Distribution of the Conifers in the Different States and Territories.

The Pacific Slope being that vast portion of the American continent whose waters drain into the Pacific Ocean (also the included Great Basin), the eastern limit of it is the vertebræ of the continent, the high Rocky Mountain range. The Great Northwest, whose forestal products are briefly discussed in this volume, is taken to be the northern portion of this great slope, limited, conventionally, on the north by the Mexican boundary crossing the various forest-clothed spurs of the Rocky Mountains—Mexico sharing thus, some of its trees with New Mexico, Arizona and California.

NEW MEXICO.

The forests of this territory are quite limited, mostly confined to the high plateaus and mountain ranges west of the Rio Grande—principal of which is the long Colorado plateau culminating easterly in Mt. Taylor, westerly in the lofty San Francisco Mountains of Arizona.

Above an elevation of 7,000 feet forms of the widely distributed Yellow Pine appear, particularly the dark-barked variety, *nigricans*. Higher on the mountains are Douglas Spruce and its cork-barked variety, the large-cone form of the Flexilis White Pine, and a few bodies of the newly discovered Arizona Cypress. The foothills and lower plateaus are covered with a heavy growth of many kinds of Juniper, including the singular thick-barked species, and notably, by that most valuable food-

yielding tree, the New Mexican piñon, tons of whose delicious pine nuts are gathered and exported annually.

ARIZONA.

With the exception of the great Colorado plateau, whose western portion stretches across central Arizona, the forest areas of this territory are limited. This plateau, embracing a region 300 by 70 miles, overlaid by scoria thrown out, ages ago, by the extinct Volcano of Agassiz (one of the San Francisco peaks), is clothed throughout its extent by a yellow pine forest, the proprietors of a large lumbering factory at Flagstaff leveling large sections of it annually. The brown-bark variety of Yellow Pine is particularly abundant in this forest. The high slopes of Agassiz and Humphrey afford homes for the large-coned form of the Flexilis White Pine and the plume-branched Foxtail Pine, the Engelmann Spruce, the feather-coned Douglas Spruce and its cork-barked variety, the flat-branched Colorado White Fir and the lovely Arizona Cypress. The foothills and broad border of this plateau are clothed with Nut-pines and several Junipers.

Southward the Mogollon and White Mountains continue sparsely, this forest covering, while the numerous detached peaks scattered over the southern portion of the territory—vestiges of vast ranges whose flanks were long ago submerged by débris from the Grand Cañon of the Colorado—offer refuge for a large variety of vegetation, much of it related to Mexico. A large-coned form of the Mexican White Pine is on the top of Mt. Graham. A secluded park in the heart of the Santa Catalina Mountains contains the northernmost specimens of the new five-leaved Arizona Pine, which is more abundant in the Santa Rita and Sierra Madre Mountains. A robust

form of Yellow Pine is abundant on the north slopes of the Chirricahua and the Huachuca Mountains. The new Broad-leaved Pine inhabits the Santa Rita Mountains, and the new Apache Pine is found in the wild, Apache-infested, Chirricachua Mountains, while the northern form of the Mexican White Pine is found along the streams in all these scattered mountains. Large sections of the eastern part of Arizona are covered with fine orchards of the soft-shelled, delicious New Mexican Piñon, while the southern portion is supplied with an overflow of the hard-shelled Mexican Piñon. Several Junipers, including the thick, oak-barked species, abound, while on several mountains occur the naked, red-limbed Arizona Cypress, and in a low, wet cañon of the Chirricahua Mountains is the beautiful Bonita variety, with never a sign of a naked branch.

COLORADO.

The western portion of this State being composed of a section of the lofty Rocky Mountains, is consequently rich in forest coverings. At altitudes of 10,000 feet and more, Engelmann's Spruce holds complete sway. Above the spruce belts are the Rocky Mountain White Pine, the White-bark Pine, the Sub-Alpine Fir, and the rare Alpine Hemlock. At lower stations are found the prim, stratified Colorado White Fir, and in certain high "parks," the thin-barked, slim Tamarack Pine takes complete possession. Below, and largely covering the cool ravines, is the Rocky Mountain variety of Yellow Pine; the ridges and mesas contain extensive orchards of the New Mexican Piñon, fringed and interspersed with masses of the round-headed ever-present commoners of the West, the small-berried Junipers.

UTAH AND NEVADA.

These two territories, embracing the greater part of the Great Basin, have similar mountain ranges and products, the latter composed of limited quantities of the Rocky Mountain Yellow Pine, the Engelmann Spruce and Douglas Spruce upon the slopes of the quite lofty Wasatch Range, while westward, in Nevada, the low and numerous short ranges bear on their tops small groves of the Foxtail Pine, and the ranges nearest the California line bear also the curious single-leaved Nevada Piñon, anciently, and at present, affording nutritious pine nuts to the resident aborigines. This pine and two or three Junipers are much used for fencing, and also for fuel in the forges of the silver mines on the Comstock. The western edge of Nevada, embracing a portion of the Sierra, partakes of the great Sierra forest, described elsewhere.

SOUTHERN CALIFORNIA.

Cropping over the southern border of California are a few trees of the cone-shaped little Parry Pine, abundant southward in the San Rafael Mountains of the peninsula. Centrally on the highest mountains of San Diego County, are found Yellow, Black, Big-cone, and a few trees of the Sugar Pine, while on the eastern slopes a few of the Nevada Nut Pines struggle for a foothold; and opposite, on the wind-swept coast at Del Mar, 20 miles north of San Diego, are found the few battling, crouching—perhaps expiring—trees of the rare, long and 5-leaved Torrey Pine. The widely-branching, bush-like California Juniper and the red-limbed Guadalupe Cypress, near the coast, complete the conifers of this county.

Across the western part of San Bernardino County, and

crossing Orange, Los Angeles, and Santa Barbara Counties, stretch several ranges of mountains in a westerly direction, separating—in more ways than one—the warm, dry, salubrious, but limited citrus region from the cooler, better-watered portion of the State.

On the highest one of the ranges—the San Bernardino Mountains—a considerable body of Black Pine, interspersed with Yellow Pine, abounds. On the lower part of the south flank fine trees of the monster Big-cone Pine are met with, and also that other prodigy of the same nature—the Big-cone Spruce—both trees being also found sparsely elsewhere, westward.

In the higher valleys of San Bernardino and Grayback are stalwart, thick-trunked trees of the usually slim Tamarack Pine, and on the south side of Mt. San Bernardino, at an elevation of about 3,000 feet, occurs a thin, interrupted belt of about 2 miles of the Narrow-cone Pine—the southernmost limit of this curious species. A few trees of Sugar Pine and of the White-bark Pine occur near the summits. The Nevada Nut-Pine reaches the eastern, or congenial desert side of the mountains, extending westward to the railroad pass of the Tehachape Mountains. The California form of the Colorado White Fir is rarely met with on the heights, and a few trees of Douglas Spruce, Incense Cedar, and the two Junipers—Western and California—complete the list.

NORTHERN CALIFORNIA.

Two widely separate and different mountain ranges uphold the unequaled forest wealth of California. The southern part of the Coast Range presents forests of Bentham's variety of Yellow Pine, above which a few Sugar Pines hang out their long pendent cones, while the

eastern slopes, facing Salinas Valley and the great San Joaquin Valley, are flecked with white masses of the Gray-leaf Pine. Groves of Big-cone Pine crown the mountains back of San Luis Obispo, and, near at hand, is the original locality of the discovery of the Prickle-cone Pine, abundant on the coasts, northward.

But the most wonderful product of the southern coast ranges is the exceedingly local Beautiful Fir, with its trim pinnacle of foliage, and its bristle-clothed cones. He who would view these graceful spires must take his life in his hands and clamber up and over the almost inaccessible fastnesses of the range of Santa Lucia, near the Monterey line; an achievement that has baffled many a sturdy mountaineer since Douglas found the tree and named it *venusta*—for the goddess of beauty—Venus.

Nearing Monterey Bay, the well-known and widely cultivated Monterey Pine and its traveling and ocean-battling companion, the Monterey Cypress, are met with, and near Santa Cruz, the first trees of the California Nutmeg gleam forth in vernal glory from amidst the first trees of the world-famous monster Coast Redwoods—of which want of space forbids further mention.

Crossing the Golden strait, the North Coast-range continues and augments the forest growth with larger collections of the redwood along the many rivers, with larger Douglas Spruce, Pacific Red Cedar, Tide-land Spruce, California White Fir, Yellow Pine, Incense Cedar, the Prickle-cone and North-coast Scrub Pine (with its dwarf variety, Bolander's Pine, near Mendocino). The inner slopes of the range are clouded with Gray-leaf Pine, while in the Scott Mountains, west of Shasta and near the town of Sisson, appear small groves of Lawson Cypress—stray members of the tribe of trees that long ago

took up a preëmption on the shores of Coos Bay, Oregon.

Small, light-green trees of the North coast Cypress are found near the south end of the range, with the larger, dark-foliaged Mountain Cypress near Clear Lake and Ukiah, while a few Sugar and Mountain Pines dominate the highest peaks of the range, with Nutmeg trees and red-berried Yew trees along the coast streams.

SIERRA NEVADA.

Crossing the great Valley of California, we approach the mighty Sierra Nevada, extending northwesterly 600 miles, with a breadth of 60 miles. Its forest—one of the largest and most valuable on the earth—comprises many species of conifers, which can only be briefly mentioned.

The lovely Gray-leaf Pine flecks the foothills, the darker Yellow Pines crowd the upper slopes, and at elevations of 4,000 to 5,000 feet the columnar trunks of the Giant Sequoia burst on the sight; Sugar Pine, and no less monstrous Douglas Spruce, the California White Fir and its red-barked, silver-plumaged relative, the Magnificent Fir, next claim admiration, while at elevations of 10,000 to 12,000 feet, the forest is fringed with the stately Mountain Pine, and crowned with the crouching, snow-bent forms of the storm-defying spires of the White-bark Pine and the drooping-limbed Alpine Hemlock.

As noted on the loftiest peaks of Arizona—the San Francisco Mountains—so the culminating peak of the Southern Sierra—Mt. Whitney—is draped with the plume-branched Foxtail Pine, and, similarly, near Mt. Shasta, is sequestered its close relative, the Balfour Pine.

From end to end of the Sierra—as elsewhere on western mountains—in high valleys are dense groves of the slender, thin-barked Tamarack Pine, while large sections are covered with exclusive forests of Black Pine or of certain varieties of Yellow Pine. The Narrow-cone pine, holding fast to every cone it ever bore on trunk and limbs, is rarely met with in the Sierra, notably near Mt. Shasta. The Incense Cedar becomes a large pyramid on

the floor of Yosemite Valley, and northward. The mountain form of California Nutmeg affects a portion of the west slope, while the Western Juniper forms large trees in higher locations, and the rare Mountain Cypress occurs near Castle Crags.

Around the solitary, towering Mt. Shasta, stretching away for miles, is a magificent Fir Forest, composed almost exclusively of one form—the feather-coned, perhaps distinct form—of the Magnificent Fir. With this marked variety—which I have called the Shasta Fir, there grows near Wagon Camp, the quite distinct Golden Fir, being large trees, with thin, finely checked bark and lovely golden-colored cones.

OREGON AND NORTHWARD.

Crossing the Siskiyou range, the natural dividing line between California and the far North—a range, by the way, on which is lodged the new Weeping Spruce—we find trees fostered by greater quantities of moisture, becoming more numerous, and often of immense size, the number of species, however, being fewer. The headquarters of this overgrowth of development is the lake-dotted region around Puget Sound, lying both in Washington and British Columbia.

Here is the historic forest primeval—vast, gloomy, almost impenetrable, where anciently the great rivers heard no sound save their own dashings.

A half dozen trees attain enormous proportions. The colossal Douglas Spruce, 15 to 25 feet in diameter and 300 to 400 feet high, the scarcely less enormous Tide-land Spruce, and Engelmann Spruce, the Western Hemlock, the Grand Fir, and Noble Fir, with the Pacific Red Cedar, comprise the bulk of the forest. Other trees, limited in quantity and size, occupy special sites. The Lovely Fir and the Sub-Alpine Fir are found near the timber line on Mt. Hood and neighboring peaks, as well as others far northward in British Columbia. Alpine trees battling with snows and glaciers are the White-barked Pine, the Sub-Alpine Fir, and the Alpine Hemlock, with a prostrate Prickly-leaved Juniper carpeting the newly vacated glacier beds.

The Alaska Cypress comes down from the Alaska Islands along the mountains, as far south as Mt. Hood, and here, too, is the great thick-barked Western Tamarack, and a little farther northward, the Woolly Tamarack.

The Tamarack Pine and the Mountain Pine are common, and near Roseburgh, in Oregon, is the original locality where Douglas discovered the Sugar Pine—still a valuable product of the region—while here and there detached groves of a form of Yellow Pine carry that invaluable species far up the valley of the Fraser. The cross-ranges of mountains also carry many of the trees mentioned eastward to Idaho and Montana.

Becoming smaller in northern regions and growing close together, festooned with long, black, funereal tree-moss, certain trees, that are only found on alpine heights of southern latitudes, are content to strike root with others in the sphagnum swamps of Alaska, only a few feet above sea-level, but in a climate similar in severity to that of their normal alpine homes. Only half a dozen conifer trees, all greatly dwarfed, and one prostrate shrub, can outlast the rigors of Alaska winters—the Coast Scrub-Pine, the Tide-land Spruce, Pacific Red Cedar, the Western Hemlock, and the elsewhere alpine trees, the Hooker form of the Alpine Hemlock, and a creeping Juniper reach the northern border of the great North-west forest.

ANNOUNCEMENT.

The undersigned desires to announce to the public that, encouraged by the encomiums passed upon recent forestry articles, and the continued requests for copies (over six hundred copies already having been sent out by mail) he is preparing a comprehensive work upon the West-American Cone-bearers, north of Mexico and west of the Rocky Mountains.

The volume will mainly consist of articles contributed to the press from time to time during the last twenty years, particularly in late reports of the California Board of Forestry—all rewritten, corrected, and also augmented by new material obtained by more recent explorations and by correspondence with the principal botanists of the coast.

The attempt is made to give, in attractive form, scientific and popular descriptions (in separate paragraphs) of this most important family of trees, that in the West comprise some sixty species with twenty-five marked varieties, and compose nine-tenths of our Pacific forest—at once the largest, the most varied and valuable in all the earth.

The volume will contain about three hundred and fifty pages and will be amply illustrated by copies of photographs of characteristic trees, taken in the forest, or of mounted specimens in the Lemmon Herbarium, or copies of paintings by Mrs. Lemmon, sketched from nature.

It is designed to issue the first edition in two forms: one the ordinary form for the library, the other with flexible covers for the gripsack of the traveler.

The price per copy may be Five Dollars, but the public will be duly informed through the scientific and popular serials when the work is issued.

TESTIMONIALS.

Professor C. S. Sargent, editor of *North American Sylva*, and publisher of *Garden and Forest*, writes editorially of my work in the California Third Forestry Report, a two-column article, concluding with:—

"Mr. Lemmon's report contains, in convenient and acceptable form, a great amount of useful and interesting information, botanical, forestal, historical, and economic, relating to the trees which compose the larger part of the Pacific forests. . . . It will be welcomed by all serious students of American trees, and will take its place in permanent literature."

Hon. B. E. Fernow, chief of the Division of Forestry in the Department of Agriculture, Washington, D. C., writes:—

"I hasten to express my gratification in finding this volume as full of desirable information from your pen as its predecessor. The illustrations, too, are most excellent. I heartily commend your work, and hope you may carry out your intentions of republishing in one book all your writings upon the Pacific slope forests."

Hon. Abbot Kinney, vice president Am. Forestry Association, writes:—

"Your enthusiasm is refreshing. You are doing royal service to Western forestry, which will be all the more appreciated as time gives the public opportunity to examine your painstaking classifications and graphic descriptions."

Professor Volney Rattan, author of "West Coast Botany," and professor of botany in the California State Normal School at San Jose, writes:—

"So skillful an attempt to bring order out of the chaos of local names, must result in much good. . . . From the mostly very bad names, you have, I think, wisely chosen the best, and the new names you have coined to replace those utterly inappropriate, are sure to be adopted. . . . The educational value of your work to the teachers, and through them to the pupils of the State, ought to be patent to the dullest mind."

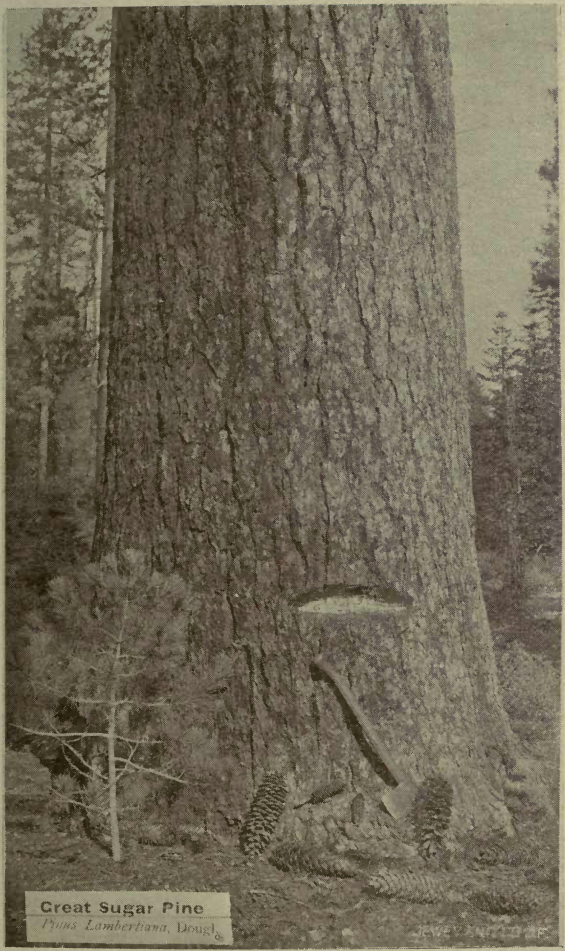
Dr. Sereno Watson, successor to Dr. Asa Gray, as director of Harvard Herbarium, Cambridge, Mass., writes:—

"Your report contains a wealth of information and is made up in good shape. You and your accomplished wife have done a good deal of hard work upon Western forestry."

Dr. Charles Mohr, the chief botanist of the Southern States, writes:—

"You have rendered botany and forestry an invaluable service, and the botanists and tree lovers east of the Rockies cannot be too thankful to you for the information we all badly needed."

Orders for "West-American Cone-Bearers," also for Mrs. Lemmon's forthcoming "West-American Ferns and Where They Grow," may be forwarded at any time, and will be filed for reference. Address J. G. Lemmon, or Mrs. J. G. Lemmon, Telegraph Ave. and Thorne St., North Oakland, Cal.



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